THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

COMPUTERWORLD

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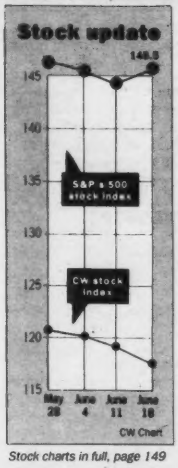

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American Airlines is charged with rigging unfair advantages in its SABRE reservation system. **Page 4.**

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IBM will likely see its earnings drop in 1986 for the second straight year, according to Chairman John F. Akers. **Page 150.**

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Britton Lee, Inc. announces an office-scale relational data base server that incorporates an IBM Winchester drive. **Page 2.**

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The High Sierra Group, an association of 13 major vendors, sets standards for CD-ROM technology. **Page 12.**

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Motorola Computer Systems rolls out a line of 68020-based supermicros running Unix. **Page 37.**

■

MCI Communications and Western Union cut rates and introduce services to compete with AT&T. **Page 19.**

■

Lotus is developing data pipelines to link mainframes and real-time sources to its 1-2-3 spreadsheet package. **Page 49.**

■

Wang Laboratories last week upgraded its WP Plus high-end word processing software, adding line drawing, image integration, automatic hyphenation, line numbering and integration with Wang Office and other software. Footnoting, repagination and spelling verification also were enhanced, the company said. WP Plus 2.0 for VS systems, available immediately, is priced between $4,000 and $12,000. Releases for Office Information System and Alliance models will be delivered in August and September, respectively, and will cost $2,000.

■

IBM may alter its sales organization to have its representatives focus more on specific product areas, IBM Chairman John F. Akers suggested last week. "We can do better merchandising of our software and other parts of the product

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Lean NCC has up side

Overly broad focus blamed for light attendance figures

By Elisabeth Horwitt

LAS VEGAS — Attendance was spotty, exhibits sparse and product introductions few (with the exception of IBM's avalanche) at the 1986 National Computer Conference held last week. And yet, vendor and attendee reactions to the show were not universally negative.

While some vendors reported sluggish booth activity, others said the number of new sales leads exceeded expectations. Attendees who said they came to NCC for a general overview of the current state of computer technology claimed they were not disappointed.

See **LEAN** page 2

Ford setting up $300M OA pact

By Alan Alper

DEARBORN, Mich. — IBM, Digital Equipment Corp. and Wang Laboratories, Inc. are bidding on a contract potentially worth between $300 million and $500 million to supply office automation and communications equipment to Ford Motor Co. over the next couple of years, *Computerworld* has learned.

Ford, concerned about retaining a competitive edge, is said to be seeking a wide range of departmental processors and communications gear to effectively route key corporate data throughout its North American operations.

See **FORD** page 6

IBM reworks mid-range product lines

By James Connolly

In what may have been the company's most comprehensive product introduction in two decades, IBM last week replaced most of its System/36 and System/38 product lines and took steps to tie those minicomputer systems together.

The announcements, made in New York and in Las Vegas, site of the 1986 National Computer Conference, covered 125 IBM products and product enhancements.

IBM may have stopped short of an actual merger of the System/36 and 38 lines, but it did offer new versions of the two machines' operating systems that will support advanced peer-to-peer networking and will enable System/36 users to log on to System/38s and run System/38 applications.

Powerful new members of the two minicomputer families, connectivity tools and a communications controller were the major products unveiled.

The key announcements included the following:

- Six models that represent a top-to-bottom replacement of the existing System/38s, each with twice the memory of its predecessor.
- Three models of the System/36, including a high-end version with more than three times the memory capacity of the earlier Model 5360.
- New versions of the System/38's CPF and System/36's SSP operating systems, with support for APPN and a pass-through facility to allow System/36 users access to System/38 applications.
- Enhanced Connectivity Facilities software, which IBM bills as its most comprehensive micro-to-mainframe link.
- Two disk drives for the System/38, high-end System/36 models and the OEM

See **IBM** page 6

CW SPECIAL REPORT

AT compatibles: System vendors push to give single-source option

By David Bright

Systems vendors that lost out by not meeting customer demands for IBM Personal Computer-compatible workstations are not about to repeat the experience with IBM's popular Personal Computer AT.

While most large-systems vendors were slow in meeting their customers' needs for IBM PC-compatible workstations, they are learning faster with the PC AT. Within a year of the AT's introduction in August 1984, at least half of the 12 largest systems vendors had announced PC AT-class machines or had machines in the works.

Rapidly becoming the workstation of choice in large corporations, an estimated 350,000 PC AT units had been installed by the end of 1985, according to one market report. The same report says that another 100,000 clone models had been sold during the same period.

The determination of system vendors to keep up with users' desktop demands has presented computer managers with an option they did not have in the early days of the PC — that of purchasing AT compatibles that link directly into the non-IBM systems upon which they have based their information systems.

James Nanton

One manager who at least partially achieving the single-source ideal is James Nanton, director of office systems at Citicorp Industrial Credit, Inc. Based in Harrison, N.Y., Citicorp Industrial Credit is in the process of installing 1,000 of Hewlett-Packard Co.'s PC AT-compatible Vectra workstations for connection to a series of HP 3000 minicomputers acting as departmental servers.

Nanton's entire headquarters staff will use the Vectras for general-purpose office applications, electronic mail and access to corporate and external data bases. The HP 3000s will be hooked through X.25 links to IBM mainframes. Although Citicorp Industrial

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NEWSPAPER

Sun announces coprocessor board, file access software

PC AT-compatible runs MS-DOS under Unix

By Rosemary Hamilton

MOUNTAIN VIEW, Calif. — Sun Microsystems, Inc. plans to announce two microcomputer-related products tomorrow, a step that two of its workstation competitors have already taken.

Sun is scheduled to announce an IBM Personal Computer AT-compatible coprocessor board for its workstations and a software package that will allow IBM Personal Computers and compatibles to communicate over its Network File System (NFS), software that allows users to transparently access files on a multivendor system.

The RT Personal Computer, IBM's engineering and technical workstation, was announced earlier this year with an optional PC AT coprocessor board. And when Apollo Computer, Inc. announced its new workstations in February, the vendor said it would offer a PC AT-compatible coprocessor board later this year. Sun's coprocessor is scheduled for shipment in the third quarter of this year.

The Sun Integrated Personal Computer will allow Sun workstations to run Microsoft Corp. MS-DOS applications in a window under the University of California at Berkeley's Unix Version 4.2, Sun's operating system.

Based on an Intel Corp. 80286 microprocessor, the coprocessor has 1M byte of memory and can execute either color or monochrome applications that require the IBM PC AT color graphics adapter or the Hercules Computer Technology, Inc. monochrome adapter. It sells for $2,390 and includes Microsoft's MS-DOS 3.1 and GW-Basic, transparent file sharing software for NFS and utilities to convert ASCII files between MS-DOS and the Sun operating system.

PC-NFS, which is available within 30 days of order, provides PC users with transparent access to files among other PCs, Sun workstations or any computer running NFS. In quantities of 100, PC-NFS sells for $305 per unit. A package with an Ethernet interface and documentation is also available and sells for $955 per unit in quantities of 100.

Lean NCC has up side

From page 1

"We're opening up a branch on the West Coast soon and want to see the technology," a representative of a Japanese software firm said.

"The show is pretty good," another corporate attendee said. "Smaller than Chicago [NCC '85], but useful." The attendee added that he and his colleague had come "not to look at any one type of product but to keep up with the technology."

NCC sponsor, the American Federation of Information Processing Societies (AFIPS), denied rumors that this year's conference lost money for the first time in its 14-year history. However, the organization is clearly taking seriously the third year of declining attendance. By the show's third day, registration was placed by AFIPS at 41,000 — approximately one-third fewer than the number of attendees originally projected by the show sponsor.

A combination of factors

AFIPS spokeswoman Marty Byrne blamed the poor showing on "a combination of location, time of year, the industry slump and fierce competition from other shows." She added that an AFIPS board meeting during show week concentrated on the high-priority topic of "how do we adjust our focus, and what resources do we have to do it?"

AFIPS sent staff members to the show floor to ask attendees what they did and did not like about the show, Byrne said. AFIPS is also trying to persuade vendors that have dropped out over the past two years to return by using such devices as assisting with advertising and offering classes on "boothmanship."

Vendors that did exhibit at NCC '86 gave this year's show mixed reviews. "Attendance is lousy," said Oracle Corp. Marketing Director Ken Cohen, hastening to add that the company's sales leads were 30% to 50% greater than at NCC '85. An opposing view was offered by William Carrico, president of network vendor Bridge Communications, Inc., who said the show had generated fewer leads than at any of the three NCCs at which his company had exhibited.

One of the most frequent complaints, both from this year's exhibitors and from companies that decided not to exhibit, was that NCC's appeal is too general and that trade shows targeting vertical markets were far more fruitful. Tony Romano, a spokesman for GTE Spacenet Corp., said that while his company was able to generate sufficient leads on the first day alone to justify its exhibit, "Our biggest show is International Communications Association."

The wide focus of this year's show was reflected in the types of products found on the floor. Attendees were offered an abundance of disk and tape drives, printers and miscellaneous items such as display screen cleaners and acoustical enclosures. But with one or two exceptions, the industry's heavy hitters were conspicuously absent.

While IBM was very much present, releasing a flood of announcements aimed directly at its networking and minicomputer competitors, most of those competitors were not around to hear the news. AT&T exhibited the new Unix System V Release 3.0 as well as a digital multiplexed interface that links the company's 3B5 minicomputer to System 75 and 85 digital private branch exchanges. But Data General Corp., Digital Equipment Corp. and Hewlett-Packard Co. chose not to attend.

Of communications vendors, local-

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IBM begins to fight mid-range competitors with announcement of System/36 and 38 processors, connectivity tools/ **7**

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IBM announces peer-to-peer networking of System/36 and 38 machines/ **8**

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U.S. Senate passes major tax reform bill, including transition rules to help a few high-tech businesses/ **150**

PRODUCT SPOTLIGHT

Once the exclusive domain of professional artists and designers, high-quality graphics programs are becoming consumer products, providing fast and economical user-generated business presentation solutions. With graphics selling as a commodity, making the appropriate purchase no longer rests on tallying up the number of "bells and whistles" a package offers but on its ability to interface to the corporate environment. By Edward F. Heite/ **57**

IN DEPTH

Image processing: Many organizations have become "paper factories" by virtue of the large number of documents they must process and store regularly. Digital image systems offer an alternative means of coping with this burden — an alternative with which many in MIS are not familiar but should be. By Connie Moore/ **69**

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Britton Lee unveils second relational system

Office-scale data server uses IBM disk drive

By James Connolly

LAS VEGAS — Seeking to increase the power available to users of its office integration scale systems, Britton Lee, Inc. last week announced the second member of its RS300 family of relational data base servers.

Introduced at the 1986 National Computer Conference, the RS350 includes the processor of Britton Lee's earlier office scale system, the RS310, as well as an enhanced data management system and new disk and tape drives.

The new disk drive is a 400M-byte, 8-in. 9332 Winchester disk drive, which was announced by IBM last week and sold to Britton Lee under a rare IBM OEM agreement. The system can support two of the IBM drives, which feature self-contained diagnostics and an error correction and control feature, or two 86M-byte disk drives produced by Fujitsu Ltd. or Control Data Corp.

The RS350 was designed to work in tandem with IBM Personal Computers and Microsoft Corp. MS-DOS-based PCs, as well as superminis such as Digital Equipment Corp.'s VAX family and the Data General Corp. Eclipse MV series.

Britton Lee President David L. Britton said the RS350 will provide performance gains over the RS310, which can be field upgraded to the new machine. He also said that where the RS310 provided performance ranging from 15 to 30 transactions per second, the RS350 performs 25 to 40 transactions per second.

"The RS310 originally was intended to go to the office integration-oriented marketplace and value-added reseller arena. The RS350 is simply an extension of how far we can go in the market," Britton said.

Unlike Britton Lee's high-end products, the IDM 500 series, the RS350 is not intended to be connected directly to an IBM mainframe. Instead, it uses a small computer systems interface bus and is available with an optional Ethernet local-area network interface.

The RS350 includes 1M byte of direct-access memory and was designed to support 10 simultaneous queries, data bases of more than 900M bytes and 50 active users in an office environment.

Lean NCC has up side

From page 2

area network (LAN) companies were most in evidence at the show. The rash of new communications products and enhancements introduced by IBM appeared to rock more than one LAN representative.

IBM's announcement at the show of an asynchronous interface option and a Token-Ring network interface for its new 3174 controller came as a blow to Bridge Communications, which had just introduced the CS/1-TR, an asynchronous communications server for the Token-Ring. "The effectiveness of the 3174's asynchronous support depends on whether it provides full screen functionality for asynchronous terminals," a Bridge executive vice-president said cautiously. An IBM spokesman confirmed that the 3174 does, in fact, support full-screen displays.

A Nestar Systems, Inc. spokesman called IBM's connectivity announcements "not revolutionary, but certainly earthshaking," adding that even with the new System/36 and 38 products, IBM does not threaten Nestar's market niche. Nestar's forte is supplying powerful data base servers to large network installations.

Delta alleges SABRE biased

By James A. Martin

WASHINGTON, D.C. — American Airlines' celebrated SABRE computer reservation system came under fire last week when a Delta Air Lines complaint alleged that American flight schedules have been falsified in the system in order to gain a competitive advantage.

According to the Delta complaint, filed with the U.S. Department of Transportation, Dallas-based American Airlines has continued to bias its computer reservation system by listing "sham schedules containing faster elapsed flight times in many markets than American intends to achieve in its day-to-day operations."

The complaint further charges American with maintaining one schedule for the public and another for its computer reservation system. The shorter flight times would reportedly enable American's flights to be listed ahead of competitors' in the SABRE system.

A spokesman for American said there was no foundation to Delta's allegations and that the discrepancies in flight schedules and actual arrival times are due to normal delays.

Delta's complaint was the latest charge of bias against SABRE, the country's dominant reservation system. American's computer reservation system is used by some 50,000 travel agents in the U.S. and reportedly handled 45% of all airline reservations made last year.

In 1984, the Civil Aeronautics Board (CAB) ordered American, United Airlines and Trans World Airlines to remove biases from their systems. At that time, American flights were automatically displayed on SABRE screens first, ahead of those of competing airlines.

More recently, the U.S. Department of Justice accused American and United of providing travel agents with an automatic bypass feature that showed a second display on the computer reservation system favoring whichever airline owned the system. The airlines subsequently agreed to discontinue the practice [CW, April 8, 1985].

American's "scheme" to favor its flights in the computer reservation system "began before the ink was dry" on the CAB ruling, Delta claimed. In addition, the Atlanta-based airline asked the Transportation Department to assess American with civil penalties, estimating that it had lost $120 million a year as a result of American's "sham schedules."

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TOP OF THE NEWS

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line," Akers told securities analysts. "Unless you can deal with your product line in pieces, you risk losing to competitors with a narrower focus." Akers said IBM will add 3,000 to 3,500 new sales reps this year.

■

GTE Telenet Communications Corp. and U.S. Telecom, Inc. signed and filed with the Federal Communications Commission last Monday the papers for a definitive agreement to merge. The filing was approved by the FCC Tuesday, but the Department of Justice still has not passed it, a GTE Telenet spokeswoman said. The two firms hope to begin operations as U.S. Sprint Communications Co. by July 1.

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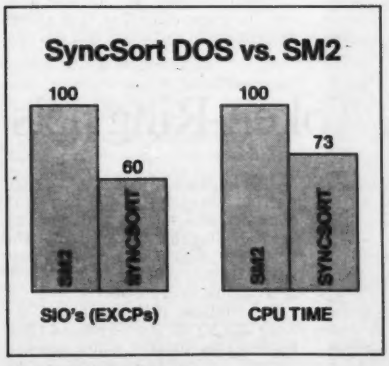

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IBM rewraps mid-range lines

From page 1

market, featuring capacities ranging from 200M bytes to 856M bytes.

- The 3174 Subsystem Controller, which acts as a replacement for the workhorse 3274 controller (see story page 8).
- Ethernet capabilities for the IBM RT Personal Computer (see story below).
- Software that allows the Rolm Corp. Central Branch Exchange to link asynchronous devices to the System/36 and System/38.

In addition to supporting improved communications among IBM's diverse systems, these announcements, according to some observers, seem to convey a message to users of both the System/36 and the System/38.

That message, delivered in part through the power boosts for both minicomputers, is that neither the System/36 nor the System/38 is about to be abandoned.

Ford setting up $300M OA pact

From page 1

The No. 2 automaker, which in April reportedly imposed a moratorium on computer equipment procurement, is now looking for a strategic partner — akin to General Motors Corp.'s relationship with Electronic Data Systems Corp. — to help formulate an integrated computer and communications strategy. Ford hopes such a relationship would rectify what sources said has been the firm's hodgepodge approach to OA.

"Ford bought so much equipment over the years, but recently they found themselves suffering from a technology glut," a source close to the bidding said. "They're now attempting to learn how to use technology to be more competitive."

For example, Ford is not only requesting that the winning bidder supply leading-edge computer and communications technology, it is also stipulating that the victor remedy existing problems, including an overwhelming amount of systems incompatibility throughout the firm.

The three computer companies made technical and management proposals to Ford during the first week of June, sources close to the bidding said. A decision is expected around July 2, the sources added.

"It's a real horse race," one source said. "It's not clear who has the edge."

Ford spokesman Jim Trainor declined comment on the impending award. "The situation is under review, and it is something we can't talk about at this time."

IBM, DEC and Wang each have existing relationships with Ford. IBM not only supplies the firm's data processing hardware and software, but earlier this year agreed to jointly develop a factory automation networking scheme. DEC supplies engineering workstations to Ford, while Wang sells departmental minicomputers to the firm.

IBM bolsters mid range with System/36s, 38s

System/38, high-end 36 get disk drives; gap to 4381 bridged

By James Connolly

LAS VEGAS — The heart of IBM's mid-range processor line was shaken up last week with the addition of nine CPUs to the System/36 and System/38 minicomputer families and two new disk drives.

The announcements, which greeted 1986 National Computer Conference attendees as they arrived at the conference, were rolled into an IBM blitz of 125 product introductions that included communications controllers, micro-to-mainframe links and an Ethernet adapter for the IBM RT Personal Computer (see story below).

The mid-range restructuring included the announcement of a high-end model and two other System/36 processors, a total replacement of the System/38 product line and new disk drives for the System/38 and high-end System/36 models.

The high-end models for each system family had been expected for several months.

IBM officials claimed that the performance boosts for the System/36, including the addition of a high-end 5360 Model D with more than three times the memory of its predecessor, will allow greater support for office automation.

In addition, industry observers noted that the top-end and entry-level System/38 announcements mean IBM is providing a performance bridge extending from the System/36 up to the 4381 mainframe.

Looking at the multifaceted announcement, International Data Corp. analyst Frank Gens noted, "If there is a disappointment, it is that tighter links for the System/36 and System/38 were not announced. But in a subtle way, they laid the groundwork for low-end networking, which will eventually make the System/36 and System/38 more competitive with Digital Equipment Corp. and Data General Corp. systems."

He noted that IBM attained performance gains for both systems without making major technological changes.

The System/38 announcements included a renumbering of the product line. The six new systems, ranging from the entry-level Model 100 to the Model 700, replace the existing Models 4, 6, 18, 20 and 40. Those earlier models will be discontinued in September but can be upgraded to new models.

The Model 100 is the only new model to which current systems may not be field upgraded. The new Models 100, 200, 300, 400, 600 and 700 will be available in August, according to IBM.

The Model 700 reportedly features a maximum main memory of 32M bytes, which is double the memory of the Model 40. As with other new models of the System/36 and System/38, the Model 700 uses IBM's 1M-bit memory chip.

The Models 400, 600 and 700 also support more disk storage than their predecessors, a maximum of 14G bytes, compared with 6.2G bytes on earlier models. That storage capacity was increased through use of the new, denser direct-access storage devices (DASD) and with the ability of the CPF operating system's Version 8 to support four, rather than two, strings of DASD.

The Model 700 ranges in price from $252,500 to $385,490.

The low end

At the low end, the Model 100 costs from $37,500 to $47,500, which is a price range that overlaps the new high-end System/36 5360 Model D. The Model 100, according to IBM officials, provides 30% more power than the Model 4 at 30% lower cost. The Model 100 will be available with 2M to 4M bytes of memory.

"The restructuring of the System/38 line seems the most significant part of the announcement by far. The fact that they are renumbering them is real interesting, because they were kind of tied down by their modeling scheme before. It was hard for anyone to perceive that there was anything significant about changes before," said Christopher Herron, president of Fusion Products International, a third-party software development firm specializing in System/36 and System/38 products.

Herron noted that the increased disk capacity and the ability to connect the System/38 to more types of systems will help that machine gain in the corporate market.

Happy user

At NCC, an information systems director for a manufacturing company was happy to see the performance boosts for the System/36 and System/38. "This shows that that family will not soon become obsolete. This gives the systems a longer life and increases the amount of work you can actually process on them," said the manager, who asked not to be identified.

IBM claimed a 50% internal throughput gain in the new System/36 5360 Model D in comparison with the earlier 5360s. The memory in the 5360 was increased from 2M bytes to 7M bytes. Field upgrades are available. Prices for the Model D range from $67,850 to $106,850, depending largely upon the memory configuration.

At the low end of the System/36 line, IBM announced the ability to add more terminals to the System/36 personal computer, the 5364.

IBM also announced the mid-range System/36 5362 Models B and C. Those systems range in price from $17,625 to $27,625. The basic difference between the two is the ability of the Model C to support the newly announced 9332 disk drive. Combined with integrated disk systems, the 9332 provides the Model C with up to 520M bytes of storage.

The 9332, an 8-in. disk drive providing 200M or 400M bytes of storage, was announced, along with the 14-in. 9335, which offers 856M bytes of storage. IBM officials emphasized that both devices contain intelligence to off-load some data management tasks from the CPU.

The 9332, costing $8,500 with 200M bytes of storage or $14,000 with 400M bytes, is available in rack-mounted and stand-alone versions.

The 9335 Model A01 includes a device function controller that allows attachment of up to four B01 devices.

RT PC linked to Ethernet, Token-Ring nets

By Douglas Barney

Amid last week's avalanche of IBM product announcements were three adapter cards that allow the IBM RT Personal Computer to tie into the IBM Token-Ring local-area network and Ethernet-based networks. IBM also announced several program enhancements for the RT PC.

"People have been screaming for token rings," noted Andrew C. Russell, manager of information activities for IBM's Information Systems Division. The IBM RT PC Token-Ring Network Adapter sells for $1,095 and will be available this month.

Much of IBM's emphasis on networking is aimed at dulling Digital Equipment Corp.'s thrusts into IBM's marketplace.

"IBM is getting very aggressive," said Marty Gruhn, vice-president of the Sierra Group, a Tempe, Ariz.-based research firm. "It is bad news for their competitors across the board.

"It is part of the continuing connectivity story that IBM is telling. They are actually starting to connect everything together. Overall, if you look at the announcements, they are delivering more and more connectivity," Gruhn added.

IBM's embrace of Ethernet with the RT PC is an unusual move, according to Gruhn. "IBM realizes that there are a lot of Ethernet installations out there, a lot of them in the engineering communities that they would like to reach with the RT PC. They realize they have to provide that connectivity, because if they don't, someone else will," Gruhn said.

IBM apparently agrees. "The engineering and scientific folks want an Ethernet attachment, and now we are providing that," Russell said. The IBM RT PC Baseband Adapter for use with Ethernet sells for $850 and will be available in September.

In addition, IBM introduced the $850 IBM RT PC Multi-Protocol Communications Adapter, which allows a variety of communications equipment to attach to the RT PC.

IBM also unveiled program enhancements for the RT PC. The RT's AIE operating system was enhanced to speed performance and add functionality.

IBM said it moved the graphics device drivers in its IBM RT PC Computer Graphics Toolkit to the AIX operating system. The tool kit will be available for $800 in September.

IBM strikes back at DEC, Wang with multiple rollouts

Introductions shore up mid-range, office lines

By James Connolly and Charles Babcock

LAS VEGAS — After several years of serving as the target of competitors such as Digital Equipment Corp., IBM has begun to fight back in the mid-range market, according to observers present for IBM's announcement of new System/36 and System/38 processors and connectivity tools last week.

ANALYSIS

The announcement of 125 products was the broadest based IBM introduction in more than a decade, company officials said. But the majority of those products were concentrated in the mid-range and office markets, where companies like DEC and Wang Laboratories, Inc. have focused on IBM's shortcomings.

Analysts noted that the connectivity tools are an IBM effort to answer its minicomputer rivals' claims of single-architecture product lines.

In addition to the connectivity capabilities, the observers noted how the price ranges for the two minicomputer lines now overlap with the addition of a high-end System/36 and an entry-level System/38.

"The entire set of announcements was clearly aimed against DEC and its success in the office market. They clearly have felt pressure from DEC," commented Bob Djurdjevic of Annex Research in Phoenix. Djurdjevic singled out the addition of Ethernet capabilities for IBM's RT Personal Computer as evidence that IBM is recognizing the power of DEC, which emphasizes Ethernet over IBM's Token-Ring network scheme.

Melding to continue

Several observers said they were surprised that IBM did not move the System/36 and System/38 even closer together than they did, although those IBM watchers note that the melding of the systems will continue.

IBM will continue to modify the operating systems on the System/36 and System/38 until it has produced versions that allow System/36 applications to run on the System/38, predicts an independent developer of System/36 and System/38 manufacturing control applications.

Such a move would result in a de facto merger of the two mid-range machines, despite their currently incompatible architectures, said David E. Alcala, executive vice-president of MRM, Inc. in Milwaukee.

The System/36's SSP operating system works with 16-bit technology that provides ease-of-use features to small businesses. The System/38, with its CPF operating system, "is clearly the superstar for IBM" with 64-bit technology and a data base management system built into the operating system, Alcala said.

One of those who expected closer ties between the systems was International Data Corp. analyst Frank Gens. "As far as real tools, like an RPG compiler, putting the System/38 on the Token-Ring and a common data base query, they are just not there," Gens said.

"I was surprised that they didn't make as strong a statement as I thought they would about how the System/38 lives. But they did turn the screws a little bit to get more performance, like more users. That has been at the top of the user's wish list for both the System/36 and the System/38 for a long time," Gens added.

Some observers who had earlier predicted that IBM would bring its SSP operating system under CPF as a guest stood by those predictions after the announcement.

"I was surprised by the lack of a CPF host announcement. But I think that is temporary. IBM has clearly indicated that they are going to let you run System/38 code on the System/36," said third-party software developer Christopher Herron, president of Fusion Products International.

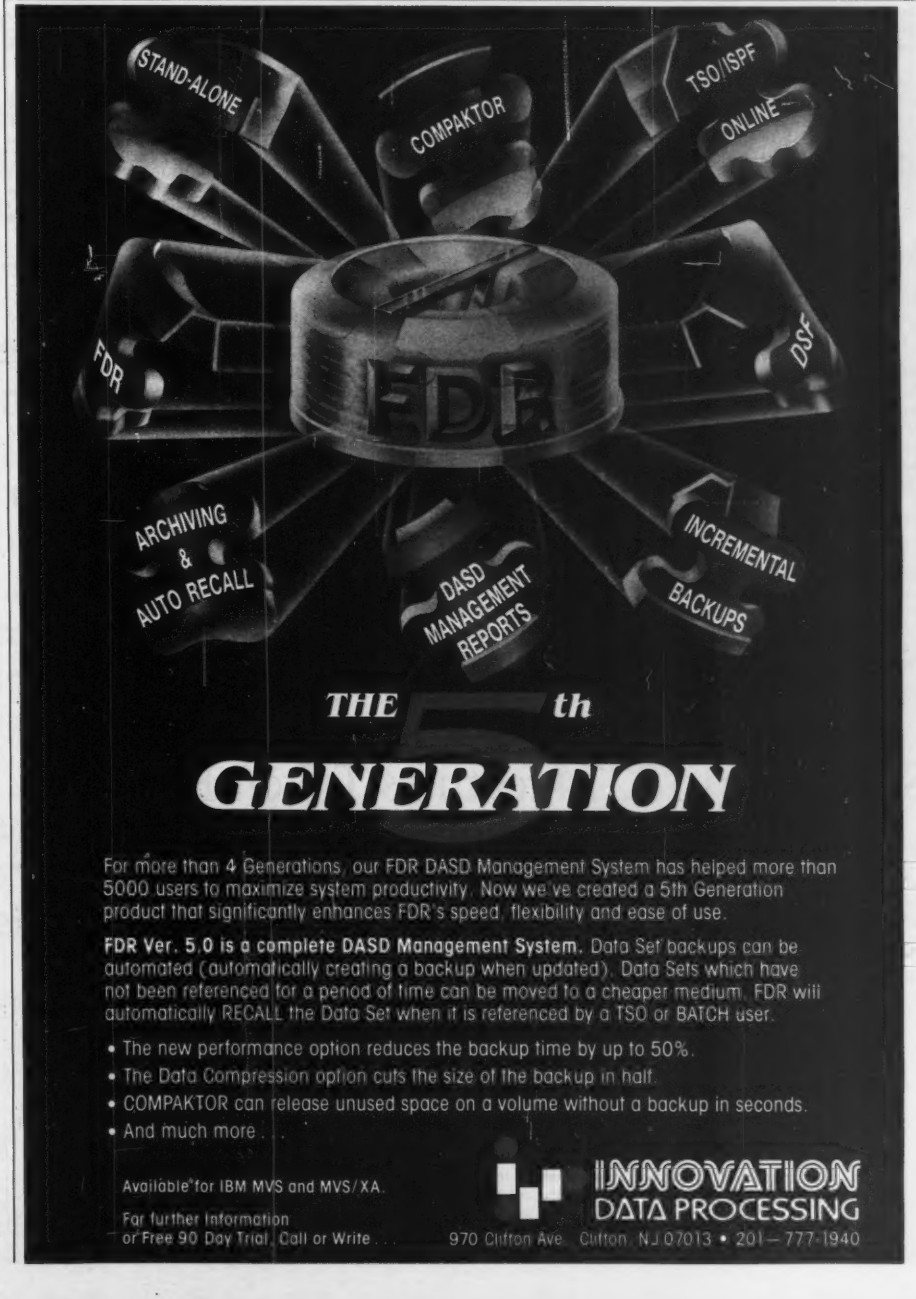
Users interviewed outside the IBM booth at NCC welcomed the mid-range enhancements. "We've been looking for a sign that IBM would continue to support the System/36. These announcements seem to confirm that," said Vince Greene, DP manager for R. A. Homes, a Tucson, Ariz., construction company.

"We're nowhere near maxed out on our current system. If it meant that we would need a new processor, we wouldn't do it anyway," Greene added when asked if he would consider migrating from his year-old System/36 to one of the new systems.

Both Alcala and a System/36 value-added reseller who asked to not be identified observed that IBM's announcement was notable not only for the new features it highlighted but also for things that it did not address.

IBM is believed to have under development a more advanced version of the System/36 than anything it announced, the two sources said, and Alcala noted the Advanced Peer-to-Peer Networking and Distributed Data Management capabilities lacked the channel-speed capabilities needed to take advantage of the new connectivity.

Staff members David Bright and Alan Alper contributed to this report.



Comprehensive PC-to-370 link announced

Software allows micro to access mainframe printers, disk space

By Eric Bender

"IBM's most comprehensive PC-to-370 link," and closer connections between the Personal Computer and the System/36 and System/38, were introduced by IBM last week.

IBM's Enhanced Connectivity Facilities software reportedly gives micro users access to host mainframe files, disk space and printing facilities. Additionally, menu-driven programs permit PC and 3270 Personal Computer users to query and extract data from hosts, transfer files between hosts and micros and issue commands from micros, IBM said.

The connectivity software offered for MVS/XA TSO/E and VM/SP hosts will permit users to access DB2 and SQL relational data bases, extracted DL/1 data and VSAM, CMS and sequential files. Data then can be automatically reformatted for micro applications, including Lotus Development Corp.'s 1-2-3 and other third-party packages.

Access to all data

For the first time, "you can get access to all the data you have on those systems," said Mary Patterson, director of cooperative processing at IBM Entry Systems Division in White Plains, N.Y. She also stated that the family's "virtual file" feature represents a new kind of function for IBM. "This gives you the capability to get a record at a time in a virtual format for PC applications," rather than requiring transfer of an entire file.

Industry analysts and consultants generally gave positive early reviews to IBM's move. "Clearly they needed to bring some sort of order to a number of different micro-to-mainframe products they'd brought to market," said Lee Doyle, senior communications analyst with International Data Corp. based in Framingham, Mass. "This gives a uniform architecture for micro-to-mainframe requests."

David Ferris, president of Ferrin Corp., a San Francisco micro consulting firm, also gave an initial thumbsup, saying the announcement underlined IBM's recognition of the strategic importance of linking micros to corporate data bases. "Information centers should like it; IBM is creating facilities which allow PC users to talk directly to DB2," he added. But he pointed out that there were no mentions of hooks into IMS and CICS.

"It's a beginning step into cooperative processing," commented John McCarthy, research manager at Forrester Research, Inc. in Cambridge, Mass. "The question becomes, Who will take advantage of it? People are really on the fence, wondering if they should go micro-to-mainframe or micro-to-departmental system."

Enhanced Connectivity Facilities products divide into PC-based "requesters" of data and services, "routers" of data and services located on PC and host and "servers" located on the mainframe. Set for third-quarter 1987 delivery, the micro requester software will cost $450.

The PC router functions will be provided in new releases of previously announced but not yet shipped packages — either the PC 3270 Emulation Program Version 3.0, available in January 1987 for $475, or the 3270-PC Control Program Version 3.0, available next month for $450.

The mainframe router functions are both scheduled for September delivery. They will be included in TSO/E Release 3 for MVS/XA, which will cost $555 in monthly license fees, and VM/SP Release 4, which has a monthly license fee of $443.

Available in third-quarter 1987, TSO/E server software will cost $1,350 per month, and CMS server software will be priced at $850 per month. Each includes host data access and virtual services, consolidating many functions found in existing IBM PC-to-370 products.

As a keystone for the new connectivity family, IBM also unveiled the Server-Requester Programming Interface (SRPI), a program-to-program interface for interconnected host and personal computer applications. SRPI employs LU2 protocols over Systems Network Architecture, the IBM Token-Ring network and IBM PC Network and from micros linked to hosts through 3274 and the new 3174 controllers.

Although IBM's PC requester and server components are not scheduled for delivery for more than a year, customers can begin writing applications to the SRPI this September, according to Patterson.

SRPI's capabilities are a subset of IBM's Advanced Program-to-Program Communications architecture. IBM intends to extend LU6.2 capabilities to programs based on SRPI in selected environments. Currently, CMS and TSO/E support only LU2, Patterson pointed out, and she emphasized that shifting to LU6.2 will not require customers to alter code written to SRPI.

Closer links with PC

Also last week, both System/36 and System/38 mid-range systems received closer links with the PC.

Among these, IBM upgraded the PC Support/36 program to offer improved virtual printer support, the Join function for the transfer facility, a "Shared Folders" function that uses System/36 folder management support to handle PC files and documents and the PC Support/36 Organizer, which lets a single-user interface invoke both PC and System/36 applications.

The PC Support/36 Expansion Feature, which doubles the number of concurrent PC Support/36 users, also was introduced. Versions for the System/36 Models 5360 and 5362 will cost $350 and ship in the fourth quarter, while a package for the System/36 PC will be priced at $140 and be delivered next January.

IBM also made some parallel offerings for the System/38, including PC Support/38 Release 8 for the 5381 and 5382 models, which features improved virtual printer support, transfer facility support with Distributed Data Management and support for Personal Services/PC 1.2 distribution and library services.

The PC Support/38 Expansion feature, which doubles the number of concurrent PC Support/38 users, will cost $350 and be available in the fourth quarter.

Successor to 3274 features Token-Ring link

By Elisabeth Horwitt

LAS VEGAS — IBM's seemingly immortal workhorse, the 3274 controller, was officially put out to pasture last week as the company unveiled a successor designed to provide greater power, flexibility and connectivity — including connectivity to the IBM Token-Ring network.

The new unit, called the 3174 Subsystem Control Unit, supersedes the 3274 line. The 3174 offers two firsts in IBM controller-based connectivity, according to product manager Edward Scharmer.

One is an interface that ties the IBM Token-Ring network directly to the 370 mainframe channel. Previously, the only available host channel-to-Token-Ring connection was through the 3720 and 3725 communications processors, noted Richard Imershein, Gartner Group, Inc. corporate vice-president.

The second new connectivity feature is an optional protocol conversion program that enables ASCII hosts and terminals attached to the controller through a telecommunications link to communicate with IBM terminals and hosts.

"The 3174 is a very powerful device and probably offers the improved performance and ease of customization users are looking for," Imershein said. "Also, customized additions that have been made to the 3274 at users' request over the years have been moved over to the 3174."

Standard 1M-byte control storage, very large-scale integration and additional control microcode makes the 3174 more powerful and upgradable than the 3274, Scharmer said. He added that IBM could provide no figures measuring 3274 vs. 3174 throughput: "It all depends on the type of data stream."

The 3174 Large Cluster Models 1L, 1R, 2R and 3R support up to 32 3270 terminals and provide direct channel, transaction processing and Token-Ring attachments. Small Cluster Models 51R, 52R and 53R support up to 16 3270 terminals. They support the transaction processing and Token-Ring connections but no direct channel connection.

Shipments begin in July. Prices start at $9,950 for the Large Cluster models and at $5,900 for the Small Cluster models.

IBM also announced the 3299 Model 3, a version of its terminal multiplexer that enables 3270 terminals to be hooked up to 3174 and 3274 controllers using telephone twisted-pair wire instead of 3270 coaxial cable.

IBM enhances peer-to-peer networking

By Charles Babcock

LAS VEGAS — IBM announced at last week's 1986 National Computer Conference that it had increased the ability of the System/36 and 38 to communicate with each other. The announcement was made in conjunction with the release of new versions of each computer's operating system and enhancements to other software running on the two machines.

The enhancements did not yield immediate praise from System/36 and 38 users at NCC because few users said they seek to operate their machines in a mixed environment. Nevertheless, several said the announcements give IBM the beginning of a mid-range processor strategy and offer customers the option of teaming the machines.

Release 5 of SSP, the System/36 operating system, incorporates Advanced Peer-to-Peer Networking (APPN), which allows System/36 users to communicate across a network of interconnected System/36s without an intervening host. APPN is available on the high-end 5360 and 5362 System/36 models.

Prior to APPN, a System/36 user "needed to access another System/36 system via a mainframe running Systems Network Architecture," said Chuck Haggerty, vice-president of development and manufacturing staff for IBM's Systems Product Division in White Plains, N.Y.

APPN controls the flow of information through a network that may be tied together by leased telephone lines, X.25 networks or IBM Token-Ring networks. APPN detects congestion on the network and automatically reduces data flow if needed, IBM spokesmen maintained.

A new layer of software on top of the System/36 operating system, Distributed Data Management Architecture Level 1.0, permits programs running on a System/36 under IBM's CICS/VS to access files on another System/36, a 38 or a member of the 370 family also using CICS/VS.

In the same vein, System/38 programs can access files residing on a System/36, Haggerty said. The System/38 Distributed Data Management Architecture is supported by Release 8.0 of CPF, the new version of the System/38 operating system.

A third major enhancement to System/36 and 38 communications is the "pass-through" facility added to the 5250 Display Station. With this facility, a user may pass through a System/36 to sign on to a System/38 and attach to a System/38 application. Similarly, a System/38 user may pass through to sign on to a System/36 and attach to an application, Haggerty explained.

A spokesman for a Fortune 500 company with 150 System/36s installed said his firm is relieved to see a growth path from the System/36 to the 38. "We've been looking for a sign that IBM would continue to support the System/36. These announcements seem to confirm that," Vince Greene, data processing manager for R. A. Homes of Tucson, Ariz., said.

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NCC serves as springboard for hardware announcements

Memorex, NEC, Toshiba, Emulex release products

By Donna Raimondi

LAS VEGAS — The 1986 National Computer Conference opened last week with a barrage of new product announcements. In addition to IBM's Monday morning introductions of 125 products, several other hardware vendors used the annual show as the staging ground for new or enhanced systems and peripheral products.

Memorex Corp. announced Toughshell, a tape cartridge similar to IBM's 3480 tape cartridge, becoming the first plug-compatible manufacturer to do so. However, Memorex's cartridge storage and transport system will not be available until the third quarter of this year, and pricing information was not released.

The company did demonstrate its cartridge storage and transport systems, and it will be immediately selling the IBM-compatible tape cartridges for $14. At this point, Memorex has not announced a 3480-type drive.

Charles River Data Systems released a family of 32-bit supermicrocomputers that use Motorola, Inc. 68020 and 68000 microprocessors. The Universe 200, 400 and 600 models cost from $8,000 to $35,000. They range in power from 1 million instructions per second (MIPS) to 3.5 MIPS. The Model 200 supports a few users, and the Model 600 supports as many as 96. All units run under Unix versions derived from AT&T's Unix System V.

Toshiba Ltd. unveiled its T1100 Plus enhanced version of the T1100 portable personal computer. This version comes with two 3.½-in. 720K-byte diskette drives, parallel and serial ports and either 256K bytes of memory, for $1,999, or 640K bytes of memory, for $2,399. The unit will replace the T1100.

NEC Information Systems, Inc. introduced its Astra XL/32 AT&T Unix-based system. The system can be used as a multiuser host, a network file server and an applications processor in computers and communications integration, a NEC spokesman said.

Based on a Motorola 68020 processor, the system includes 16K bytes of cache memory, a Motorola 68461 paged memory management unit, a 68881 floating-point math coprocessor and an eight-port intelligent multiline communications processor. The base unit costs about $25,000.

Emulex Corp. unleashed a Digital Equipment Corp. Unibus host adapter, the UC14. The device, which connects DEC's PDP-11 and VAX-11 series machines to the small computer systems interface, is said to give the Unibus CPU expanded storage and backup capabilities. Users can choose from a variety of 5¼-in. Winchester disk drives or ¼-in. cartridge tape drives.

The system features optical disk drive support, a small computer systems interface protocol controller, a 20K-byte data buffer and 18-bit addressing. It also includes adaptive direct memory access, which releases the bus to other devices with a lower priority based on bus requests. It sells for $2,200.

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IBM display stations debut

By James Connolly

LAS VEGAS — In addition to offering new models of the System/36 and System/38 and connection tools for those minicomputers, IBM unveiled at the 1986 National Computer Conference last week a series of terminals for use with those and other systems.

The 3191 display station is a member of the 3270 display system family and reportedly features a 12-in. monochrome screen. It costs $1,295 and was designed for use with IBM 4300, 3030, 3080 and 3090 systems.

The 3196 was designed to provide users of the System/36 and 38 the same capabilities as the 3191. It also sells for $1,295.

The 3194 color display station is said to be a high-function workstation for online transaction processing on a host computer. It costs $2,895.

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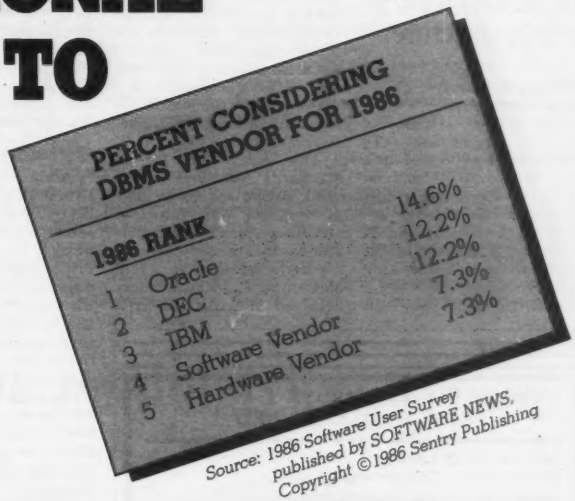

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Standards let CD-ROM disks run across multiple systems

Multivendor panel defines structure

By Maura McEnaney and Edward Warner

LAS VEGAS — Compact disk/read-only memory (CD-ROM)technology received a boost at the 1986 National Computer Conference last week with the Tuesday announcement of standards that will let CD-ROM disks run across multiple operating systems.

CD-ROM technology allows massive amounts of data to be stored on a single compact disk. Although the technology has received much attention up until now, there has not been a standard way to define the logical file structure or layout of the information on the disk.

The logical file format standards announced last week define a volume table of contents and directory structure for CD-ROM. The standards are the work of the High Sierra Group, a consortium of 13 major vendors involved in selling CD-ROM technology. First formed in October, the High Sierra Group includes among its members 3M Corp., Apple Computer, Inc., Digital Equipment Corp., Philips Subsystems & Peripherals, Inc. and Sony Corp.

Intent of standards

According to High Sierra Group Chairman John Einberger, director of software products for Reference Technology, Inc., a manufacturer of CD-ROM drives, the standards do not address either the content of the specific files or the data structures used within those files. The intent, he said, was to allow applications to read data from a CD-ROM without regard to the operating system. The standards also allow CD-ROM to address multiple characters sets for different languages.

"The standards guarantee interchangeability of disks across different hardware," Einberger told *Computerworld*. "One logical format allows all disks made for this format to play on all computers."

The High Sierra Group standards have been forwarded to the National Information Standards Organization and the European Computer Manufacturers Association for final approval.

Some firms not involved in the High Sierra meetings criticized the proposal. CD-ROM logical format standards were not necessary, according to Harvey Martens, director of sales for Reteaco, Inc. of Willowdale, Ontario.

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According to Martens, "The whole discussion about standards has created a confusion that didn't need to be there."

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"It's a very tantalizing technology," says Robert Moes, Philips Subsystems & Peripherals, Inc.'s director of marketing. And, he says, the biggest challenge facing the industry is selling the idea to users.

A quick check of 1986 National Computer Conference exhibitors however, told a story of plenty of existing hardware but little software to support it. CD-ROM drives are being exhibited at the Philips and Hitachi Corp. booths.

"Right now CD-ROMs are mostly in vertical niches where the drives are sold to go with the data," notes Philips' CD-ROM marketing manager Robert Van Eijk.

— Maura McEnaney

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Rising business use of PC hasn't pushed out 3270 terminal

L.A. water district micros run mixed applications; 3270s do dedicated jobs

By Jeffry Beeler and David Bright

LAS VEGAS — Although IBM Personal Computers continue to make inroads into the world of big business, they are by no means entirely displacing traditional 3270 terminals, a spot survey of 1986 National Computer Conference attendees suggested last week.

On the contrary, PCs and 3270s appear to coexist peacefully inside most user organizations, with each product category filling a different application niche, according to MIS executives at the show.

Micros do, however, appear to be finding their way into large organizations at a significantly faster pace than conventional dumb terminals.

Typifying last week's user responses was that of Ronald Kennedy, assistant director of administrative services at the Metropolitan Water District in Los Angeles. Most companies still "have room for both kinds of equipment" and will probably continue to do so for some time to come, Kennedy said.

Micros for business pros

At the Metropolitan Water District, an estimated 150 terminals connect to the organization's central IBM 4381 and are used mainly for dedicated production jobs like data entry, accounts payable and financial analysis. The firm's micros, in contrast, have found their way primarily into the hands of business professionals and support mixed applications as well as enable their users to make queries against their mainframe data base, Kennedy said.

"When we first obtained our PCs, we did so with the understanding that we would eventually connect them to our 4381," he said. But exactly how they intend to accomplish that feat has yet to be completely decided. "We probably don't have any clearer idea of how we're going to link our personal computers to our mainframe than anybody else does," Kennedy conceded.

In the realm of micro-to-mainframe links, the Metropolitan Water District currently finds itself in pretty much the same boat as Eaton Corp.'s AIL Division in Deer Park, N.Y. Of the approximately 225 PCs the division has installed thus far, only about a dozen connect — through 3270 emulation — to the firm's host processor. Half of that total resides in the organization's information center.

But despite the reliance on 3270 emulation, "we haven't completely solved the problem of micro-to-mainframe links, either," said Mark Wiesenberg, manager of the Eaton division's information technology.

Still favoring 3270s

Like the Metropolitan Water District, Wiesenberg's employer uses a combination of intelligent micros and dumb IBM terminals. For transaction processing and other mainframe applications, the firm still favors 3270s. "The price/performance of PCs hasn't yet reached the point where we can afford to put intelligent devices on every user's desk," Wiesenberg said.

At the moment, the company still uses about twice as many terminals as it does PCs. But the balance of installations is rapidly shifting in favor of the latter. "We're definitely installing PCs faster than we're installing 3270s," Wiesenberg said.

A mixture of PCs and 3270s is also the rule of the day at Airborne Express Corp., where terminals are unlikely to soon give way completely to microcomputers, according to David Griffing, the firm's senior technical consultant. Terminals remain firmly entrenched at Airborne in the area of customer service, a dedicated application that requires no accounting or spreadsheets.

"Airborne is a lean company," Griffing said. "We don't like to put technology in the field where there's no clear need for it." To date, the company's tactic has helped it to minimize costs. But if micros drop to the same price level as 3270s, Griffing said, the firm will consider acquiring PCs rather than terminals.

In at least a few companies, however, 3270s are slowly being replaced by PCs. One such firm is the Rand Corp., a Santa Monica, Calif.-based think tank. Until recently, the research and development group had been buying some 200 of the IBM terminals per year. Now, however, the situation is changing dramatically.

"This year, there are zero terminals in our budget," said Ron Shell, manager of Rand's computation center.

The reason for the abrupt shift in purchasing patterns is that the firm began obtaining PCs that support 3270 emulation. During the past 2½ years, Rand's micro base has swollen from 20 to about 400, primarily because the machines outperform terminals in the company's main application — text processing, according to Shell.

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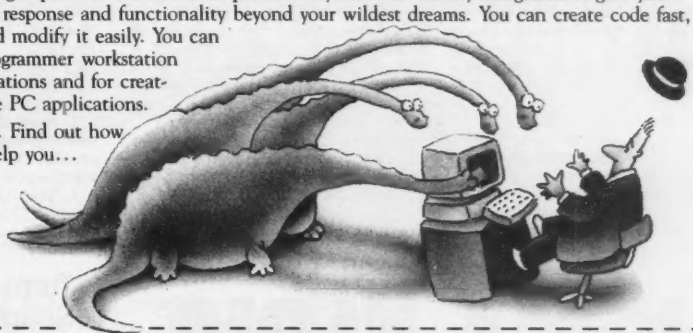

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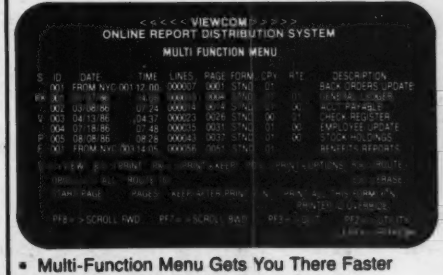

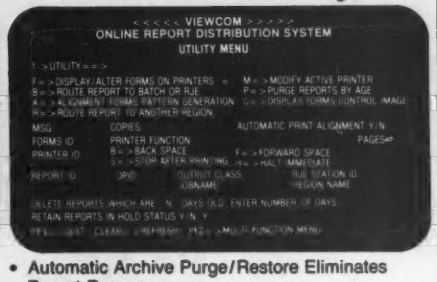

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AT compatibles: Vendor options

From page 1

Credit already had some PC ATs installed, Nanton explains, the Vectra was selected because of the users' need to be integrated with the HP 3000s.

In addition to HP, other major systems vendors that offer PC AT-class machines of varying degrees of compatibility include AT&T, Honeywell, Inc.'s Information Systems Division, NCR Corp., Sperry Corp., Tandem Computers, Inc. and Wang Laboratories, Inc.

Meanwhile, Data General Corp., Digital Equipment Corp., Prime Computer, Inc. and, perhaps, Burroughs Corp. are all believed to have IBM PC AT compatibles in the works, according to company and industry sources.

In getting existing systems customers to purchase its IBM PC AT compatibles, HP has been the most successful of the major systems vendors, says Jan Lewis, president of the Palo Alto Research Group. She estimates that 30% of HP's installed minicomputer base has chosen the Vectra over other models.

About 25,000 Vectras were installed during the machine's three months on the market last year, according to figures from International Data Corp. (IDC), a market research firm based in Framingham, Mass. Lewis says the micro-to-mini software uniformity, coupled with its compatibility, is a big plus for the Vectra.

Waiting may not hurt vendors

Though DEC and some of the other systems vendors may seem to be dragging their feet on PC AT compatibility, it may not hurt them too much in the long run, predicts Ralph Gilman, senior vice-president of market research company Infocorp.

By waiting, the vendors will be able to incorporate the latest technology into their machines, such as a multitasking version of Microsoft Corp.'s MS-DOS, which is expected later this year. "Everybody obviously has them [AT compatibles] waiting in the wings," Gilman says. "They're waiting for the right timing. It gives them a little more flexibility."

Underscoring the importance of connectivity to the host system, the State of Ohio Bureau of Workman's Compensation filled its IBM PC AT-compatible needs with NCR's PC8 systems.

The bureau chose the NCR models over IBM's because they could be better integrated with the NCR host mainframe, explains Lou Pieper, communications coordinator. "Nobody disregards IBM. Had they been able to communicate easily with our mainframe, they certainly would have been considered," he says.

While many of the systems vendors have an excellent chance of solidifying their customer bases — as well as bringing in extra revenue — with PC AT-compatible machines, some seem to be approaching the issue with less zeal than others.

"We are not in the PC game," says Gene Manno, group vice-president of Honeywell's Small Computer and Office Systems Group. "We are bringing the workstation of choice to our own market."

Honeywell's IBM PC AT-compatible AP systems are built by NCR. However, Manno says that Honeywell's overall strategy involves a high degree of compatibility, "seamless" communications with Honeywell hosts and extra "goodies" such as proprietary coprocessors. "Not too brilliant, but it sounds like it'll work," Manno comments.

Tandem's AT-compatible workstation

That general sentiment is echoed at Tandem. Responding to customer requests, the maker of fault-tolerant computer systems introduced last month the 6AT IBM PC AT-compatible workstation.

While the workstations offer slightly richer features — like a 40M-byte hard disk drive compared with the IBM PC AT's 30M-byte drive — for a slightly lower price, Tandem plans to sell them only to existing customers and has no plans for fancy innovations, says Jim Pawlik, product marketing manager for intelligent workstations.

Instead, "we are going to let technology call us," Pawlik says. "With a product like the 6AT, we are not going to go out and innovate."

DEC's VAX-Mate AT-compatible system, already being beta-tested, should be announced soon [CW, June 16]. This will be DEC's second attempt at capturing the desk. Its 4-year-old Rainbow microcomputer did not catch on as hoped, partly because it was not IBM PC AT-compatible, but also, says Lewis, because it was not part of the VAX family.

Running proprietary operating systems, DEC's higher priced Professional microcomputer systems are designed for a limited, more technical audience.

Since the Rainbow's introduction, however, DEC has been steadily extending the VAX family downward. The VAX-Mate should offer IBM PC AT compatibility as well as the ability to tie in closely with VAX systems. Backing into compatibility this way should turn out to be a smart strategy for DEC, Lewis says.

To "stay in tune" with the industry, DG is at last readying an IBM PC AT-compatible system, hints Jeffrey Joy, product manager for intelligent workstations. DG has been later than most systems vendors in jumping on the PC AT bandwagon. Previously, much of the company's efforts in the PC AT area were focused on laptops.

Last year, with its Dasher/One IBM PC AT-like model, DG took its first big step toward integrating desktop PC ATs in its total environment.

"The one CPU user concept is not going to go away," Joy acknowledges. Although the Dasher/One

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runs MS-DOS, it is not truly PC AT-compatible. It uses 3½-in. disk drives instead of 5¼-in. drives — although IBM recently introduced 3½-in. disk drive options for its systems — and it will accept only DG-supplied add-in boards.

It is uncertain whether DG's PC AT-class machine will also be somewhat less than IBM compatible.

Burroughs also appears to be realizing the need for some degree of IBM PC AT compatibility. Although Burroughs has been successful with its B25 family of workstations (at least 56,000 units installed, according to IDC figures), which run the company's proprietary BTOS multitasking operating system, it may also be gearing up for some sort of IBM PC AT-class device, hints Jim Smith, product marketing manager for workstations.

It is not clear whether the device will come as a stand-alone unit or as an expansion box for the B25, but it likely will not be incorporated within the B25. Smith does not deny that Burroughs is planning for IBM PC AT compatibility. "Anything is possible," he says.

Designed by Convergent Technologies, Inc. and now manufactured by Burroughs, the B25 runs MS-DOS as a task under BTOS. Unlike some systems vendors, such as Honeywell and Tandem, that sell workstations primarily to their customer bases, approximately 50% of the B25 units sold annually go to accounts with IBM hosts, says Smith.

Burroughs contracts with U-Haul

Burroughs recently signed a $10 million contract with U-Haul International, Inc. for 4,000 B27 workstations, which are part of the B25 family.

The units will be installed in U-Haul's 1,200 rental offices in the U.S. and Canada and linked via telephone lines to two NAS9000 IBM plug-compatible mainframes at the company's Phoenix headquarters.

Speed, multitasking and clustering capabilities and a large, 15-in. screen were the chief reasons the workstations were chosen from roughly 30 bids, says Lawson Roberts, U-Haul's chief administrator and director. When the selection process began, however, the IBM PC AT was not yet on the market.

Despite other requirements a customer may have, price is often the overriding factor in some situations. Most systems vendors with PC AT compatibles take care to make their prices competitive with IBM's, but such caution is not always enough.

At one U.S. Army installation where IBM PC AT compatibles were needed to connect to both remote and future on-site Wang VS minicomputers, Zenith's Z248 system won out over the preferred Wang APC because of a huge price differential.

Taking advantage of the opportunity to tap into an Air Force contract with Zenith, the Army unit ordered 100 of the Zenith systems, and only three out of the 30 Wang APCs that were originally planned have been received, says the Army MIS officer, who asked not to be identified.

Although the Zenith systems should cost well under $3,000, compared with nearly $7,000 for similarly equipped Wang APCs, the officer says he would rather have the Wang systems. "Nothing will tie in to the Wang VS system as good as the Wangs," he notes.

> ***While many systems vendors have an excellent chance of solidifying their customer bases — as well as bringing in extra revenue — with PC AT-compatible machines, some seem to be approaching the issue with less zeal than others.***

While the officer prefers the APCs, he is irked by their lack of high compatibility.

"A lot of the really nice-to-have software — all the new developments — go to the IBM and the IBM compatibles," he says. "Wang is definitely behind the power curve on that." He adds that it is difficult to find third-party hardware for the Wang systems.

Introduced last summer, the Wang APC runs approximately 85% of off-the-shelf IBM PC AT applications, says product manager Michael Guerette. He stresses that Wang has always given high priority to terminal emulation.

"We have put a lot of effort into integrating our personal computers with our VS minicomputers. We were perhaps one of the first vendors to have a very high-speed link from our PC to our VS," he said.

Wang has also added several ease-of-use features, such as an expanded keyboard and a menu interface for user control of MS-DOS. A 67M-byte hard disk and a tape backup — features not found on the IBM PC AT — are optional.

Lewis of the Palo Alto Research Group expects IBM to keep the PC AT imitators on their toes by doing such things as changing its read-only memory BIOS more frequently. As IBM keeps moving, maintaining compatibility promises to be a "constant struggle," she notes.

Nevertheless, IDC research indicates that shipments of Intel Corp. 80286- and 80386-based compatibles should surpass IBM PC AT shipments in 1987, tallying 972,000 units vs. IBM's 910,000.

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VIEWPOINT

EDITORIAL

Connections the IBM way

It was a start. IBM did not merge its System/36 and System/38 product lines last week, but at least its dramatic 125-product mega-announcement at this year's National Computer Conference did appear to signal recognition of the importance of having the System/36 and 38 talk to each other. This was in apparent reaction to extensive user surveys and sharply articulated demands, as reported in this space two weeks ago.

Conversely, it was also evident from last week's announcements that IBM will presently forgo the concept of running a single hardware architecture and operating system for all mid-range machines.

This is noteworthy given that the single-architecture approach — from desktop to host — is popular among IBM's competitors in the superminicomputer field and has been enthusiastically embraced by their customers. Thus, even though IBM is not linking systems to the extent found at Digital Equipment Corp. and Data General Corp., it has gone further than ever before to establish some degree of commonality.

Meanwhile, IBM appears to have made it easier, through a series of communications tools, for large users to link networks of System/36s and 38s for accessing data and applications on multiple computers. IBM also seemingly eased the migration path for smaller users moving from the System/36 to the System/38, not by allowing direct porting of applications to a System/38 but by letting the users overlap the removal of a System/36 and installation of a System/38.

The ideal, of course, would be for IBM to establish application transparency among all its systems, and one excellent step in that direction might be the oft-predicted shift of the System/36's operating system under the System/38. That said, we must pay heed to IBM's rebuttal point: that it does not need a single architecture, that the company has such a broad user base that it is unreasonable to think that IBM could ever design a single system to optimally support engineers, banks, clerical workers and manufacturers.

Smaller companies, with a more narrow user base and more limited product line, can deal with such situations more forthrightly. A corporate monolith like IBM must continue groping for the sound, responsible middle ground — and continue to listen to its users.

Notes & observations

The real news from this year's NCC is that its sponsoring organization, the American Federation of Information Processing Societies, has not been adhering to basic business principles in the packaging, promotion and administration of this trade show. We must confess to having a soft spot in our hearts for this, the precursor of all computer trade shows and still the leading MIS-oriented computer conference. For NCC to succeed, however, AFIPS must move immediately to preserve its existing (though rapidly dwindling) exhibitor/client base, conduct professional marketing surveys to learn what real and potential attendees are seeking and then package the whole with a coherent marketing strategy. If AFIPS does not act quickly, we may have seen the last NCC.

LETTERS TO THE EDITOR

Part-time work offers DP stability

The last 10 years have been a time of transition for data processing. The amount of work and people involved has multiplied exponentially; women now occupy many of the positions that used to be open only to men. Data processing itself has expanded from scientific calculations and printing paychecks in a few businesses to every area of every type of business.

With this change have come new challenges, not the least of which is finding and retaining qualified personnel. Data processing folks seem to lack the company loyalty of other professionals, jumping from one company to another. Colleges cannot seem to produce computer graduates fast enough; even so, these new faces need a great deal of training for environments that grow ever more complex. The quantity of systems being produced has generated a great need for employee retention. Many solutions have been proposed, with limited success. One option that needs to be eyed seriously is allowing part-time workers.

Most companies shy away from this. Part-timers have been associated with low-skill, temporary work. Their loyalty is often nonexistent; their quality of work is low. These observations, however, represent the past experiences of people who have seen this in unskilled positions; these part-time folks use jobs for financing a transition to "greater things."

There has arisen a new need in DP, however. This is best expressed by the many women (often new to the profession) who become pregnant and wish to spend time raising their children. The scenario goes as follows: A woman gets pregnant. Around the time of childbirth, maternity leave is arranged. The woman, desiring to raise her child, asks for a change in status from full time to part time. This is refused for "company policy" reasons.

The baby comes, and the woman goes on leave. After the leave, one of two inevitable events occurs. The first is that the woman makes arrangements with a day-care center and the second is that she returns only for a short period of time, or not at all. In the end, both parties lose.

A similar case happens with an individual who has a bachelor's degree and desires to proceed to master's work. This can be achieved in one to three years full-time, depending on the program. Part-time school means three to eight years, along with sacrificing time with spouse and child. Also, work never ends "at work"; long days for work, class and studies become a point of contention between student and family. Long hours over a long period of time also lead to an unproductive worker. Again, both parties lose.

A solution would be to allow these people, temporarily or permanently, to work part time. The many hours of training invested would not be lost; full-time status could restored (under agreed-upon conditions); most of all, employees could be retained.

This is obviously not a universal panacea; part-time folks could not be used in certain stages of a new development project. These folks would probably fit in maintenance situations and development groups that are ready to design and code their programs. The key, though, is that valuable personnel would be retained and useful.

Tom Pella
San Diego, Calif.

Hopper's retirement regrettable

I was somewhat appalled to hear of Captain Grace Hopper's forced retirement [CW, May 26]. I had the opportunity to hear her speak at a users conference. Captain Hopper is effervescent, warm and humorous and has an energy level that many people half her age do not have. I wish her well in her retirement and in all her future endeavors. She is an asset to our country and has much to offer to the computing community.

Steven Steinbrecher
Fort Lauderdale, Fla.

SDI reliability debate worthwhile

Professor Hertz' article "SDI demands trillions of instructions, 99.9999999% reliability" [CW, June 2], raises some good hard questions over the reliability of the Strategic Defense Initiative or Star Wars.

As computer professionals and as citizens, we all need to ask these hard questions before the Strategic Defense Initiative becomes embedded in our economy and lulls us with a false sense of security.

Thanks to *Computerworld* for providing a forum for debating SDI.

Susan Lee Price
San Jose, CA

VIEWPOINT

Vendors, users just can't see eye to eye on copy protection

You are a crook.

You work with computers, don't you? And you need software to run computers don't you? That software can be copied, and you probably are bright enough to do the copying. In light of this fact, you probably should not be allowed access to corporate computer systems. Right? Of course that's right.

The way that certain software vendors are screaming about more and more regulation, the above statements might as well be true for anyone who ever sat in front of a VDT. Because an irritating number of software vendors are now selling their packages first and foremost with the idea of how to make sure no one makes off with an illicit copy of this product, the emphasis is no longer on how well the product performs to specifications or whether it meets the user's needs.

Protection becomes most important

No, the important thing in bringing a software product to market is to include a little facility that makes sure those scheming weasels disguised as users don't find a way to copy it.

Newquist writes and consults on artificial intelligence and other advanced high-technology topics from his office in Scottsdale, Ariz.

There's a little-used adage that says the customer is always right. In many software houses of the 1980s, not only is the customer not always right, but he is always a swindler.

Just imagine how many dollars are lost by these poor companies. Try. Actually, don't bother trying, because these companies can tell you down to the dollar how much money they have lost in revenues from illegal copying. If that's the case, have them round up each of the copies that accounts for this dollar figure.

By HARVEY P. NEWQUIST

As the vendors shift blame and accusation on to the individual, it becomes almost inevitable that they expect individual users to have their foreheads stamped with their software registration number.

The idea of software protection becomes almost as pressing an issue as government security clearances and facilities access. The latter is a fascinating realm of technology, and if certain software vendors want to invest in the technology, it sure beats planting destructive little worms into a user's computing systems.

To be fair — and nobody said that life was — a number of companies are already dropping their copy protection schemes at the insistence of large users. And as each week goes by, other vendors are finding that irritable customers are not always repeat customers.

Now, if that irritability stems from hassles with copy protection, and irritability prevents customers from buying more software, doesn't it stand to reason that copy protection is standing in the way of more sales? Why, gosh yes, it does! Isn't it amazing how these things work? As software vendors reach this higher plane of enlightenment, a better bottom line starts to take shape out of the mist. Miraculously, those nasty little protection schemes are dropped. And you thought that vendors weren't concerned about the needs of the customer.

It is a fact of life that there are keys, codes and commands that every company in every industry uses for protection. But take for example one of the newest, most efficient means of making sure that only the proper people have access to certain facilities (for software purposes, translate this as "one disk, one user").

Called the Eyedentification System, this product recognizes users by something far more advanced than their registration numbers or even fingerprints. It uses the retinal eye pattern of the inside of a person's eye to verify identity.

A potential user has his eye scanned by an instrument using infrared light that records and stores the pattern of blood vessels.

Pattern must match to gain access

Then, to gain access — or to get telephone technical support — this same user looks into a device which scans the eye again, matching the retinal pattern to the one stored in memory.

Since very few people are willing to permanently alter the insides of their eyeballs or are born with the exact same biometric features, the chances of false access are a mere 0.0001%. Maybe one of these devices ought to be included whenever you shell out $495 for a piece of personal computer software.

Will the software industry go this far to protect profits? Highly doubtful. But something needs to be done to put the sale of software back into perspective, something that puts mutual benefit ahead of mutual distrust. It's certainly overdue, and you don't even have to ask people if it's out of control.

Because you can see it in their eyes.

Strategic planning tempers data management with business judgment

READER'S PLATFORM

By BOB DJURDJEVIC

"A manager without a plan is like Moses wandering in the desert for 40 years," wrote one of our client executives to his staff. "If he [Moses] had had a plan," the letter continued, "he would have turned left at the Dead Sea, and the Jews would own all the oil in Saudi Arabia."

Such a zealous sales approach in stating the importance of strategic plans is seldom needed anymore in the North American computer industry. Our business schools and the computer vendors have combined to make strategic plans axiomatic even in smaller companies. The former spewed out the manpower, while the latter provided the processing power. The results are the millions of spreadsheets without which businesses could no longer run. Or could they?

You see, the reason the time may have come to pause and reassess the real value of today's strategic plans is that the pendulum may have swung too far toward our reliance on technology. Such a trend may have dangerous consequences if seasoned business executives begin to forfeit the judgment calls they used to make to their staff or the computers. Here is what can happen if one confuses judgment with the legwork which most computers or the MBAs so competently perform.

A very bright young analyst (with a master's degree in business administration to boot), employed by one of the nation's well-known market research and consulting firms, was asked by a client to explain why some of the numbers in a particular product forecast turned out the way they did. Without batting an eyelash, the young man reportedly responded, "Because our model said so." The almighty model.

The extent to which such attitudes may typify the planning processes in our industry is the extent of the danger that senior executives will face when delegating the planning responsibilities down the line. Let's face it — many of the senior corporate executives are still intimidated by computers, and are (unjustifiably) in awe of them. Consequently, many hire young computer "whizzes" to run them instead of making an effort to master the new technology themselves. By doing so, however, these executives deprive their companies of their judgment and experience.

Those among the senior managers who do take the trouble to learn how to use computers quickly realize that even the most advanced computer technology or some of the business schools' brightest graduates simply don't measure up when faced with the complexity of the task at hand — crystal ball gazing.

That's because developing strategic plans has always been a combination of art and science. Too much art, and the plans go awry because insufficient data was considered. Too much science, and one can no longer see the forest for the trees, as they say. So, where does one draw the line?

Even the answer to the preceding question requires judgment. This opinion, by the way, comes from a person who has breathed, thought and, at times, even dreamed computers for a better part of the last two decades.

Effective planning is a game in which senior executives engage in "computer wars" with their aides, challenging the young upstarts' computer models all the way. That, of course, requires a certain amount of computer literacy on the part of the executives. And that, in turn, precipitates a change in attitudes, a willingness to get their hands dirty again.

Take IBM, for example. It is hard to imagine another company with either more brain power or computing power at its disposal. Nevertheless, all that didn't prevent it from making at least two major strategic "misguesses."

The first one took place in the late 1970s, when IBM underestimated the impact that lower prices would have in creating additional demand for its products. The second is still in progress. This time, the company overestimated the demand at current prices. How do these errors happen?

Monetarily rich, spiritually washed out

One can't be sure. An important factor, however, is that somewhere along their climb of the corporate ladder, leaders of such large companies lose their feel for the business. Perhaps they begin to depend too much on their staff and on technology rather than on the instinct that got them started up the ladder in the first place. Whatever the reasons, many arrive at the executive suite — monetarily rich but spiritually washed out.

Take somebody like Buck Rodgers, for example, IBM's self-professed quintessential sales executive. In his book *The IBM Way*, Rodgers writes that "when IBM's commitment to being the best service organization in the world bar none ... was announced to the employees, the spirit within the company soared."

Fat chance! Executives like Rodgers just help reinforce impressions that many large company leaders indeed live in a dream world.

Someone once said that "too many people use strategic planning the way a drunk uses a lamppost — to lean on rather than shed light." The executives who get involved, who make strategic planning a source of light and not just a prop on the executive ladder, are likely to be our CEOs of the future.

Djurdjevic is a computer industry analyst and president of Annex Research, a Phoenix-based computer research and consulting firm.

VIEWPOINT

TURNAROUND TIME

Larry Long

***Q** I report to the director of corporate information systems. She hired me six months ago to be the manager of programming. At about the same time, she became absorbed with the idea of creating an MIS plan and assigned a senior analyst to devote half of his time to planning. Unfortunately, the resulting plan emphasizes hardware acquisition instead of systems development.*

Half of my programmers are working on "hurry up" projects, and the other half have no idea what they will be working on next month. Since I've been here, the priorities have changed from week to week. My former employer compiled an MIS plan that provided some direction for the programming effort. My boss is very proud of her new plan, but it does not address current or future systems projects.

Without causing undue tension, how do I ask her to enhance the plan so that we have some order and purpose to our work? All of us would feel much more comfortable with a set of priorities that would enable us to at least finish what we start.

Tell her in the way of a status report. The report would, of course, include your concern about managing in reaction mode and your desire for better short- and long-term direction. Mention that you need this direction to effectively schedule and use the resources within your realm of responsibility.

A good MIS strategic plan is driven by information and processing needs, not by hardware needs. If, during the course of the conversation, it becomes apparent that she doesn't recognize this very basic planning maxim, you may need to hint that she consider a more integrated plan.

You will probably be putting out fires for the rest of your days if your boss refuses to broaden the scope of her planning activity. If so, I wish you the best of luck in your next job.

***Q** The work that I did in automating certain plant operations resulted in the elimination of five jobs. Ultimately, 25 jobs will be eliminated. After that, we have no definite plans for further automation.*

We don't anticipate any people being laid off. Nevertheless, rumors are flying that most of our 250 workers will be replaced by robots. This simply is not true, but nothing I say seems to convince them otherwise. Do you have any suggestions?

Our society is becoming an information society. The question is not whether we automate but when and how much we automate. This is a time when management and labor must be open and frank with one another.

I would suggest that you invite a labor representative to serve on the team evaluating any future proposals to automate plant operations. This gesture implies that labor will be fully informed of and involved in any future automation, from conception to implementation.

This may not be what plant personnel want to hear, but it may provide some small comfort. Tell them that during the next decade more jobs will be lost because of a lack of automation than an implementation of automation.

***Q** Currently three marketing/advertising professionals and two secretaries report to me, and I have authorization to fill an empty position with another professional.*

The job description calls for someone with experience or a degree in marketing, but what I need is someone with a solid computer background and an interest in marketing. The personnel department refuses to change the job description for all the product marketing managers.

My group is paving the road for other product groups in the area of microcomputer applications. However, we're beginning to get in over our heads and need help to progress any further. A couple of DP programmers have been helpful, but the time they can devote to our microcomputer needs is very limited.

Everyone in marketing, including my boss, is very impressed with what we have done, but they don't know enough about computers to understand that we are on the verge of making some serious productivity gains.

How do I convince my boss and the people in personnel that we need a micro specialist?

Tell your boss that within five years, more computer specialists will work in the user areas than in centralized MIS departments.

Then ask your boss if your company can afford the luxury of bucking this trend, considering that the company will miss out on opportunities for productivity gains and, possibly, opportunities to gain a competitive advantage.

Those companies that refuse to change policy or revise the organizational structure to accommodate the trend of moving technical expertise closer to the user should be preparing to play catch-up during the next few years.

Long, president of Long and Associates, is a consultant, lecturer and author in the field of information services. If you have a question you'd like him to address, send it to Larry Long, Editorial Department, Computerworld, P.O. Box 9171, Framingham, Mass. 01701-9171.

LOCAL DATA
MAP TO
IBM CONNECTIVITY

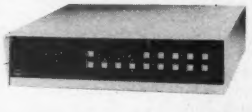
It's Easy to Solve IBM Connectivity Problems With Local Data Protocol Converters

Get immediate host access from an async PC, CRT or printer with DataLynx/3274 or 5251. Use it instead of a cluster controller for economical, secure local and remote connectivity.

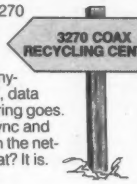
A Fresno (CA) hospital uses DataLynx to bring nine DEC VT-100 terminals on line with a BSC host 200 miles away at Blue Cross offices in Los Angeles.

The hospital transfers confidential patient and medicare data to Blue Cross using inexpensive async modems. Administrative productivity is increased through better patient account control and cash flow problems are solved with faster insurance compensation payments.

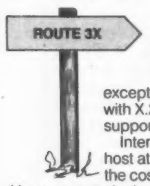
InterLynx/3287 attaches virtually any low cost ASCII printer anyplace you can plug in a 3287, allowing a major department store to access their IBM 4381 with a Texas Instruments 850. This provides an efficient and inexpensive method of printing bridal registry service announcements. The credit department also uses the TI850 for efficient printing of records and reports.



Convert your 3270 coax devices to RS-232 today. Then place your coax terminals anywhere your PABX, data switch or LAN wiring goes. Mix or match Async and Coax terminals in the network. Sound great? It is.



TruLynx PC software provides fast easy file transfer to IBM host programs through DataLynx Protocol Converters. In one major application company executives update financial planning databases from PC's at home and in the office. In another application source code for large mainframe application programs is transferred to and from PC's for demonstration, test and editing.



Local Data offers two excellent System 34, 36, 38 connectivity products. DataLynx/5251 provides exceptional dialup async access with X.25 and ETU file transfer support.

InterLynx/5251 connects to the host at the twinax port, eliminating the costly communications adapter. Users access the host by way of asynchronous modems or local RS-232C connections.

InterLynx/5251 moves data at 38.4Kb and supports print rates to 5200 cps. DataLynx/5251 recognizes up to 32 LUs, dual sync hosts and supports data at 19.2Kb and 9600 baud.

Customers of a restaurant supply house in Denver dial an IBM/36 host through a DataLynx/5251, check inventory levels, current pricing and perform their own order entry.

This is especially helpful to ski area concession operators who prepare large quantity orders during off hours, cutting delivery time to their mountain locations.

The supplier gives better sevice, maintains improved inventory and passes savings on to his customers. The customer has better inventory control, schedules deliveries to suit his needs, and maintains easy communications with his supplier.

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COMMUNICATIONS

DATA STREAM
Elisabeth Horwitt

Ku-band dearth around the bend

Talk about tragic ironies. A year ago, when a transponder glut was keeping satellite bandwidth prices at rock bottom, satellite-based network vendors were struggling to make their sales.

This year, just as many American businesses are waking up to the advantages of Ku-band satellite-based communications, a Ku-bandwidth shortage looms.

The reason: National Aeronautics Space Administration shuttle disasters have cut off the supply of new transponders in space, at least temporarily.

And the problem is not limited to NASA. There was a recent shuttle blow-up at Ariane, the European Space Agency's satellite launching facility in French Guiana.

Ariane is the only other launching pad currently available to commercial satellite companies.

According to a recent report on the very small aperture terminal (VSAT) market by the New York-based research company Link Resources Corp., at least 22 Ku-band transponders will remain on the ground this year because of shuttle failures.

The report further states that demand for Ku-band capacity is increasing. VSAT network hardware and services revenue was $99 million, according to Link; in 1990, revenue should climb to $765 million, the report claims.

GTE Spacenet Corp. spokesman David Dines claims Ariane will not have another launch for three to six months,

See **KU-BAND** page 25

Horwitt is Computerworld's *senior editor, communications.*

Rate cuts aimed at AT&T

MCI, Western Union offer WATS-like services

By Elisabeth Horwitt

Continuing to chip away at AT&T's dominant position in the business telecommunications market, Western Union Telegraph Co. and MCI Communications Corp. recently announced rate cuts and new telecommunications services that directly compete with AT&T offerings.

MCI announced Prism III, a WATS-type service that targets the same business customer as AT&T's direct-dial Pro America service, according to MCI Communications President Bert C. Roberts Jr. Pro America is a discount plan for small, dial-up business customers. Prism III targets business customers with long-distance bills of between $500 and $2,000 per month, a segment constituting 40% of the $7.5 billion WATS-type service market, according to Roberts.

Offering nondiscount rates ranging from 10 cents to 28 cents per minute, Prism III is priced 5% to 15% below AT&T WATS and 25% to 35% below AT&T direct dial rates, according to MCI. The service offers volume discounts, 6-sec. billing, accounting codes and distance-sensitive pricing. This differs from the traditional WATS offering that charges a set rate for all calls, based on costs for transmitting to one geographical region or "band."

"AT&T initially offered banded services because they make it easier to predict and control costs," said Daniel Rosenbaum, editor of "Wiretap," a Morristown, N.J.-based industry newsletter. However, AT&T may soon be phasing out banded services, he added. Megacom, for example, is a "more or less distance-sensitive form of WATS."

The Prism III offering is made possible by the fact that local telephone companies are in the process of implementing equal access on their central office facilities, Roberts noted.

MCI already offers Prism I service, targeting customers spending more than $10,000 a month for long-distance services, and Prism II, which is cost-effective for customers with monthly bills of $2,000 to $10,000. Unlike some MCI offerings, the Prism services do not charge higher rates

See **RATE** page 22

IBM boosts 8100's connectivity

By Rosemary Hamilton

RYE BROOK, N.Y. — Software enhancements recently announced by IBM will allow applications running on IBM 8100 Information Systems to be accessed by workstation clusters on the IBM Token-Ring Network, the PC Network and the System/36, the company said. The enhancements are available now at no extra charge with Release 3 of the DPPX operating system.

The enhancements enable IBM Personal Computers emulating either an IBM 3278 Model 2 or 3279 Display and connected to a Token-Ring or PC Network to access DPPX or 370 applications via the DPPX Router.

This is accomplished by the network controller running either the entry-level version or Version 2 of the IBM 3270 Personal Computer Emulation Program. Version 2 also supports file transfer between the 8100 and individual PCs on the PC Network. File transfer is evoked at the PC via PC commands. It can not be initiated from DPPX.

System/36 users can also access DPPX applications via the Router. The System/36 must be emulating a 3274 controller and the terminals attached to it must be defined as 3277 Displays.

The new DPPX Workstation Support (DWSS) capability offers an expanded file/retrieve application interface that allows users to send, receive or delete documents in the DWSS folder. According to the vendor, this enhances the user's control over the storing of Displaywriter, IBM PC or DPPX-generated documents and also of document distribution over a Systems Network Architecture Distribution Services (SNADS) network.

See **IBM** page 22

INSIDE

Bellcore tests show the capacity of existing copper lines can be increased to handle ISDN requirements/**22**

NEW THIS WEEK

- Network Software Associates enhances its family of PC-to-PC communications software

For more on this and other new products, see pp. 93-117.

INSTANT ANALYSIS

"At least when IBM says a computer architecture's day is done, it gives the product a last boost to give users time to adjust to the situation."

— David Terrie, president, Newport Consulting, on the fate of the IBM 8100.

Siemens, Fujitsu each announce modular PBX offerings

Users can start small, grow with upgrades

By Stanley Gibson

Two new entries in the private branch exchange (PBX) market, both modular and expandable, were recently introduced by Siemens Information Systems, Inc. and Fujitsu Business Communications. Both systems will allow a company to start with a 40-line PBX and gradually increase its size by adding standard boards and cabinets. Both systems offer, among other features, least-cost routing, automatic call distribution and a T1 interface.

The Fujitsu Focus 960 can handle networks ranging from 40 to 2,000 lines, at prices ranging from $600 to $700 per line. The Focus 960 replaces the Focus Elite PBX, introduced in the early 1980s, which could handle 40 to 500 lines. An Elite PBX can be upgraded to a 960 system with minor software and hardware changes, a Fujitsu spokesman said.

The Siemens Saturn IIE PBX is designed for users with 40 to 600 lines, at prices ranging from $400 to $1,000 per line, depending on the configuration and installation requirements. The new product fills a gap between the Saturn II, which handles 40 to 200 lines and the Saturn III, which is designed for 150 to 864 lines.

The Saturn IIE has twice the capacity in the same cabinet size as other Saturn models and, in smaller configurations, it has about 25% to 30% better price/performance than the Saturn III, according to a Siemens spokesman. The Saturn IIE can also be upgraded to a Saturn III by adding hardware, the spokesman said.

The modular approach is part of vendors' strategy for establishing a customer base of small companies that will require network upgrades and enhancements over time, noted T. Doane Perry, a telecommunications consultant with International Data Corp., in Framingham, Mass.

"Companies are trying to have a one-upsmanship of types of modularity," said Perry, pointing out that there are in fact two kinds of modularity, one of size and the other of applications, such as the voice mail and automated attendant add-on packages.

Shared tenant services (so-called smart buildings) constitute one major target market for modular PBXs, according to Perry. An incremental strategy is an important way to compete in such a market, he noted.

"It's a service business. Having an incremental strategy is part of it," Perry said. In the shared tenant market, especially, modular PBXs are likely to face a resurgence in competing Centrex services that are based on telephone companies' central office switches, Perry predicted. Centrex services can be expanded to meet a building's requirements and can also be tailored to meet several clients' specific needs, he pointed out.

Perry said that while companies

See **SIEMENS** page 25

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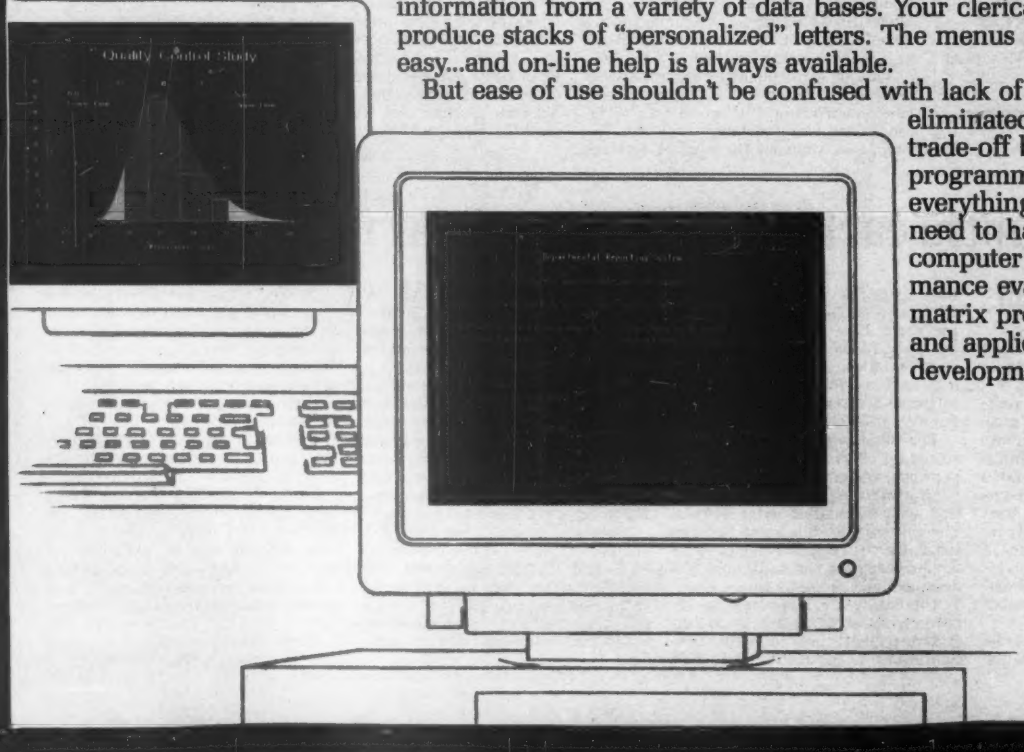

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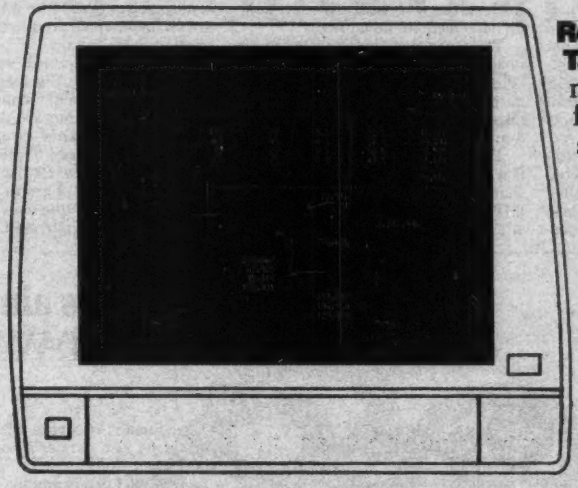

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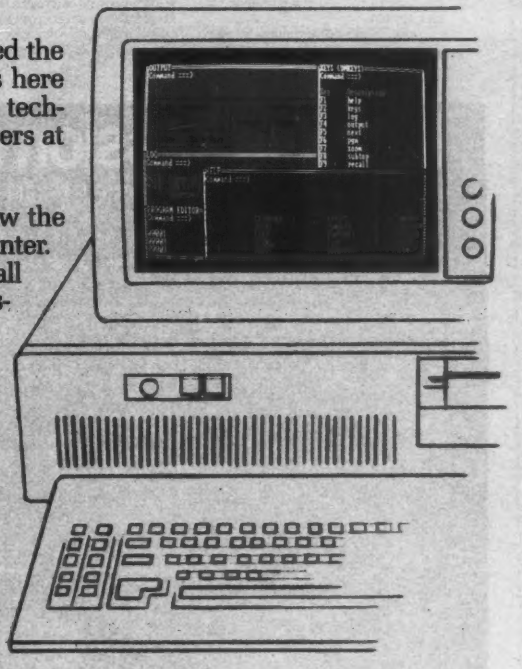

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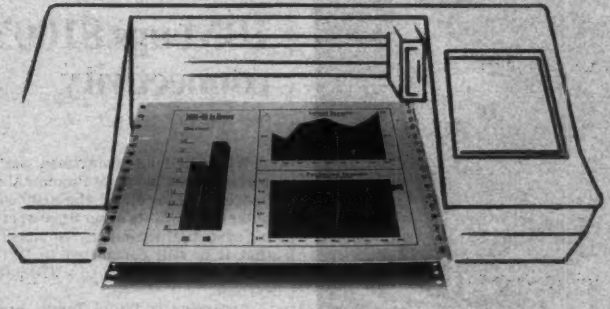

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Bellcore field test reveals ISDN one step closer to U.S. reality

Existing copper lines withstand increased rate

LIVINGSTON, N.J. — A technology that would enable most existing copper subscriber lines to support the Integrated Services Digital Network (ISDN) Basic rates was successfully tested by Bell Communications Research Corp. (Bellcore) recently.

The trial represents a "major milestone in making ISDN a reality in the U.S.," according to Richard A. McDonald, district manager of distribution characterization and engineering at Bellcore.

The digital system tested will carry information at 160K bit/sec. in each direction on a standard copper subscriber line, compared with the usual top rate of 9.6K bit/sec. for conventional analog technology. The 160K bit/sec. rate can support the ISDN Basic connection that defines two 64K bit/sec. B channels plus a separate 16K bit/sec. D channel that carries signaling and packet-switched data. The remaining 16K line is for overhead, McDonald added.

McDonald said the 160K bit/sec. rate is sufficient capacity to simultaneously handle typical predicted ISDN line use, such as a high-quality voice connection, high-speed data service and several lower speed services such as a home security alarm and meter reading.

Bellcore is hoping to find a line code that will work over virtually all loops shorter than 18,000 feet, which would include most subscriber lines in the areas where ISDN will initially be implemented, he added.

The technology being tested is one of several being proposed as a digital subscriber loop transmission standard to the T1D1.3 group of the T1 Committee of the Exchange Carrier Standards Association.

The trial tested a line code, which is a method of translating a signal so that it can travel on a copper-based ISDN local loop between the subscriber's customer-premise equipment and the telephone company central office switch.

The line code used in the field trial is called 4B3T because it translates four binary bits into three ternary symbols. This permits more information to be squeezed into a line with a lower bandwidth requirement, according to McDonald.

The 4B3T standard was jointly proposed by ITT Telecom and Siemens AG. Also under consideration by the T1D1.3 group are three other line code standards proposed by AT&T and Northern Telecom Corp., British Telecom and British company Stantel. The T1D1.3 group is seeking a consensus on a line code standard by October, McDonald said.

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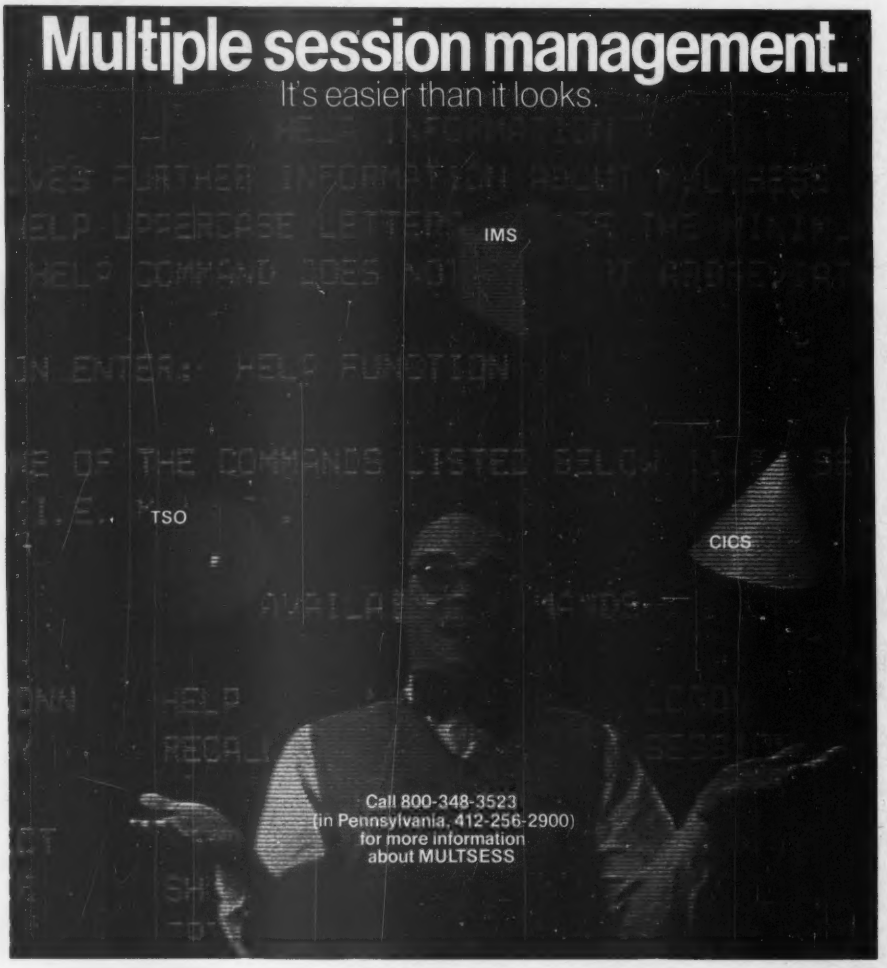

Rate cuts aimed at AT&T WATS

From page 19

to customers in areas not directly served by the carrier's communications lines.

"Prism III nicely rounds out MCI's Prism line," Rosenbaum said. Prism III is available for immediate installation with the installation fee waived through August 29.

Western Union announced plans for an 800 Optimized In-WATS service, which currently is only available from AT&T, according to a Western Union spokesman. The 800 Optimized In-WATS service enables customers to dial out on the same lines used for incoming toll-free 800-number calls. Like MCI's Prism, Western Union's 800 Optimized In-WATS service employs a distance-sensitive rate structure rather than traditional band-based billing.

The company also announced discounts of 15%, 20% and 25% for fixed-term subscriptions of one, two and three years, respectively, for its private line and medium- and high-speed data services.

Western Union further revealed that it has designated 118 additional cities as "on-network locations" directly served by the carrier.

IBM ups 8100's connectivity

From page 19

While IBM has confirmed that it will introduce no more functional enhancements for either the 8100 computer or DPCX, its other 8100 operating system, the company emphasized that it is still committed to DPPX, which may be moved to a 370-based system.

According to David Terrie, president of Newport Consulting in Boston, "This announcement gives 8100 users more time to figure out what to do by allowing them to link the computer to more strategic IBM products such as the System/36 and the Token-Ring.

"It allows the 8100 to die a little more gracefully," the consultant added.

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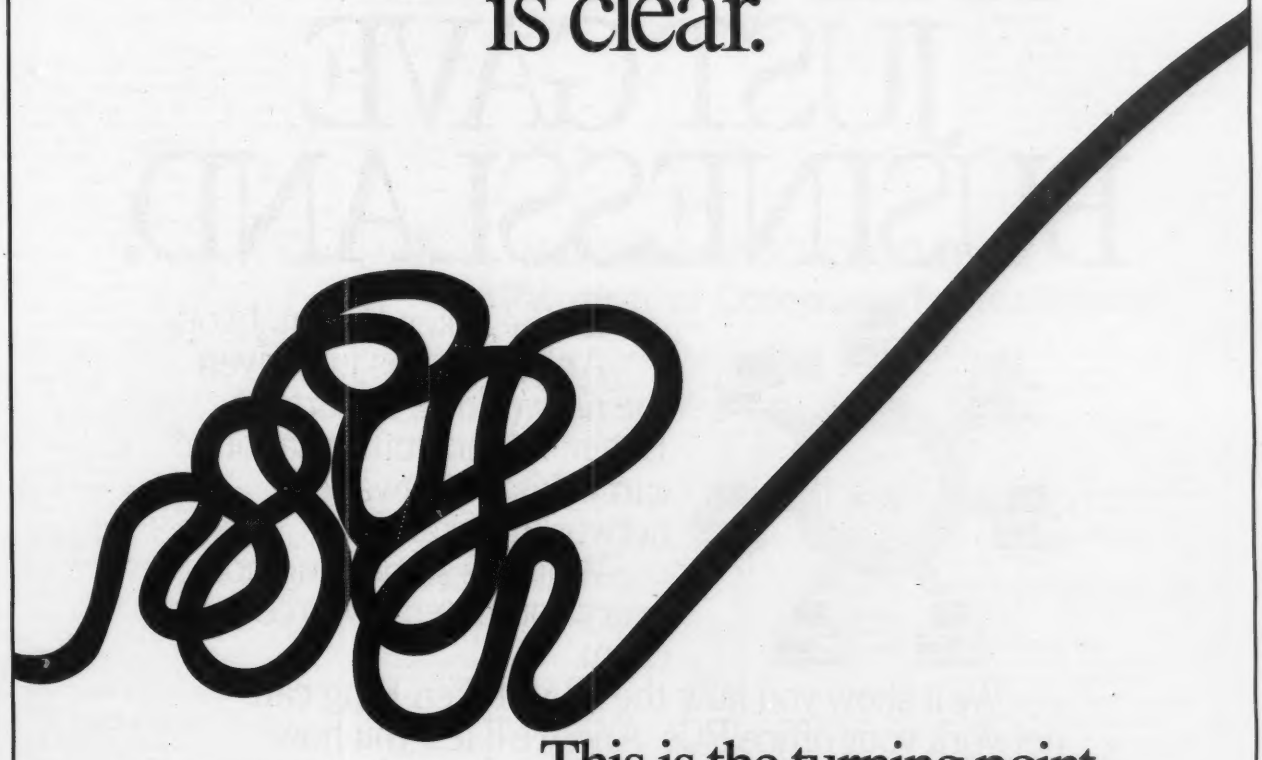

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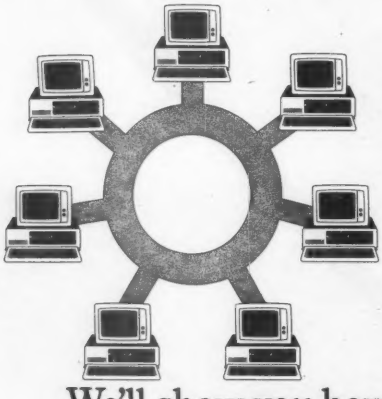

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Ku-band dearth around the bend

From page 19

and NASA will delay launches until 1987. "There is a transponder glut right now, but the recent disasters have put the cost of launching out of sight, and obtaining insurance close to impossible."

According to Dines, GTE is sitting pretty up there in space, with four satellites' worth of Ku-band transponders.

"We'll be in good shape if this problem continues," he enthuses. "In a year, satellite prices are likely to really go up, so it would be a good idea for businesses to sign up now for long-term contracts."

While this sounds suspiciously like a sales pitch, there may still be some useful advice here for telecommunications managers who are vainly trying to keep up with their companies' exploding communications needs.

The next twelve months may be the best time to seriously consider the trade-offs of terrestrial vs. satellite links — while there is still time to reserve satellite bandwidth at bargain prices.

Satellite-based networking has two main drawbacks. First, wet weather can interfere with transmissions. Second, propagation delays resulting from the round trip into space make the technology unsuitable for some data protocols, bisynchronous in particular, and, according to some terrestrial network vendors, for high-speed transmissions as well.

Satellite vendors will tell you they have solved the propagation delay problem in various ways. However, weather-related troubles are still an issue, especially for companies that place a high priority on network reliability.

E. F. Hutton & Co., for instance, currently broadcasts stock information on the C-band, which reportedly is less vulnerable to bad weather than the Ku-band.

On the plus side, a new satellite terminal can be installed in a matter of days or even hours, while it can take several months to install a leased line.

The second satellite advantage is cost. As satellite companies will tell you, leased-line prices have been soaring since the divestiture.

However, the emergence of Ku-band satellite transmission and VSATs, small, inexpensive satellite dishes often designed to support Ku-band transimission, has significantly lowered the cost of entry-level satellite networks.

Frequency above microwave, radar

Unlike the C-band, which has been the predominant commercial satellite bandwidth until recently, the Ku-band is a high-enough frequency to not interfere with ground-level transmissions such as microwave and radar. This means a Ku-band dish can be installed without a Federal Communications Commission license.

A typical Ku-band satellite network provides either one-way or full duplex communications between VSATs installed at a large number of remote branch offices and a larger earth dish or "hub" installed at a central site. Each VSAT costs anywhere from several thousand dollars for receive-only dishes to $9,000 or more for interactive dishes, while the hub costs between $500,000 and $1.5 million.

Companies such as Tymnet/McDonnell Douglas Network Systems Co. and AT&T Communications offer shared-hub services to customers. Transponder space is generally leased: a tenth of a transponder can be leased for $13,000 to $15,000 per month, which will support a 120-to-150 node full duplex network, according to Comsat Communications Corp.

The break-even point between satellite and terrestrial network costs is highly debatable. One vendor claims that the satellite network is cheaper for any installation greater than 50 remote sites; another puts the number at 200.

Some industry experts say satellite networks are most cost-effective over distances of 200 miles or more, but at least one vendor claims to offer price benefits for a cross town network.

Clearly, there is no universal equation for figuring the satellite vs. terrestial trade-off; each company must decide on the basis of its own communications needs.

The point is that satellite links offer enough potential benefits to deserve a place in many businesses' networking calculations. Bearing in mind the looming transponder shortage, it might be a good idea to reserve a place soon on the Ku-band-wagon.

Siemens, Fujitsu announce PBXs

From page 19

such as Siemens and Fujitsu are seeking market share by designing their products in a modular fashion, others are simply trying to buy their way into the market by pricing their products below cost.

Once market shares are established, vendors will try to sell numerous add-on products to users, he added.

Siemens and Fujitsu are reportedly both discussing the possibility of selling their equipment through GTE Communications Corp. GTE would sell Siemens' central office equipment and Fujitsu's PBXs, Perry said.

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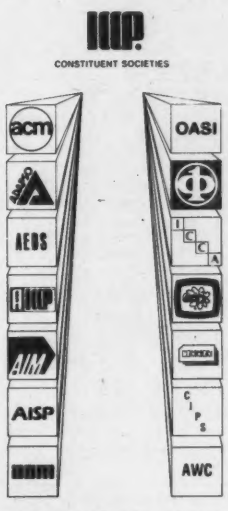

The Certified Computer Programmer (CCP) exam offers three CCP specializations and a common general section. The three specializations are: Business, Scientific and Systems Programming.

The Certified Data Processor (CDP) exam is directed to senior-level personnel. Therefore, the examination is limited to those who have completed 60 months experience.

The Certified Systems Professional (CSP) candidate must have a minimum of 12 months of professional experience as a manager, consultant or project manager.

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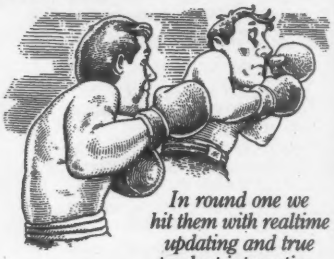
Financial Software Showdown Round 2

Computer Associates steps into the ring with a buyers check list and a free trial offer. Will anyone else answer the bell?

We recently published a Buyers Guide to financial applications software that opened a lot of eyes. Now we are coming back for round 2 with a do-it-yourself check list. If you are currently using—or thinking of buying—MSA, McCormack & Dodge, or any other financial software, find out if they can answer "yes" to each of these questions. You'll quickly see how Computer Associates wins with Advanced Business Software.



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Are the products so completely integrated that changes in one are immediately reflected in all others?	YES	
On average, can the General Ledger be installed in under 2 hours?	YES	
Can implementation be accomplished without high priced outside assistance in as little as 3 to 4 months?	YES	
Does the vendor offer the opportunity to trial the product using your data and on your system?	YES	
Does the vendor offer user aids like online HELP and PC based tutorials?	YES	
Does the vendor offer on-site installation and on-site training at no additional charge?	YES	
Can the products be implemented without forcing a hardware upgrade and can they be maintained without significant additional personnel cost?	YES	

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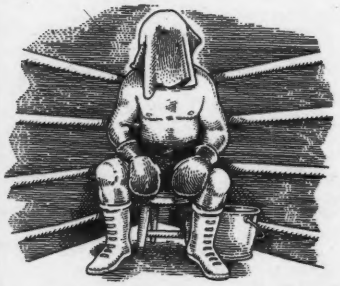

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SOFTWARE & SERVICES

SOFTALK
Willion H. Inmon

One analyst is better than two

The recent arrival of the programmer and programmer analyst workbenches on the data processing scene has given birth to the single-analyst project.

The single-analyst project is a project that is taken from inception to final testing and acceptance — from requirements gathering to the completed construction of the system — by a single analyst. The advent of the single-analyst project signals the shift from the age of the specialist to that of the generalist in the development of systems.

A very powerful case can be made for the productivity gains that are possible in the single-analyst approach to the development of systems. When a single analyst builds a system, there is automatic continuity from one phase of the project to the next. When the project is passed from hand to hand in the traditional project development life cycle, a certain amount of energy is expended to maintain the momentum and continuity of the project.

When a single analyst carries a project through the different phases of development, there is a minimal learning curve that is incurred. The single analyst formulates the solution to the requirements just once. But when a project is passed from one hand to the next in the traditional fashion, the learning and reformulation curve must be re-

See **ONE** page 30

Inmon is a senior principal with American Management Systems in Lakewood, Colo., an author on the subject of data base design and a regular contributor to Softalk.

Social security down under

Aussies use on-line 4GL, DBMS to run department

By Charles Babcock

In Australia, where the natural order of things frequently seems upside down, a fourth-generation language and data base management system run the Department of Social Security's largest production system.

It is the relational properties of the data base that allow the system to work, said Data Base Administrator Tony Bolt in a telephone interview from his office in Canberra.

The social security system down under is the equivalent of the U.S. unemployment office, welfare agency and retirement pension system rolled into one. The data base is actually broken down by states, but the largest of these, in New South Wales, lists 700,000 pensioners, 750,000 family allowance beneficiaries and 250,000 unemployed.

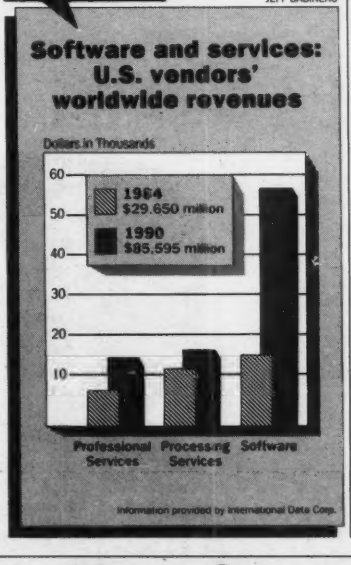
Routine payments to these recipients are made through Cobol batch programs, but providing answers to questions about the status of clients and payments in each benefit program is the task of the department's on-line inquiry system. It has been fashioned from the User fourth-generation language and Model 204 data base management system, both products of the Computer Corporation of America (CCA) in Cambridge, Mass.

The batch processing has been organized to serve benefit programs located in the same proximity on the disk storage system, speeding updates. But the on-line inquiry system is organized logically around recipients' names, without regard

See **SOCIAL** page 34

DATA VIEW

JEFF BABINEAU



Sales reps' data targets prospects

By Mitch Betts

Organizations as divergent as Detroit Edison Co., an electric utility in Michigan, and Scandinavian Airlines System (SAS), the world's 15th largest airline, are discovering they can get competitive benefits from building a data base of market intelligence gathered by their sales representatives.

The goal of both organizations is to have sales agents provide information about prospective and current clients and to implement this into a data base for management to use for planning marketing and sales strategies.

SAS, for instance, finds that when sales agents provide a detailed customer profile, the firm can generate mailing lists for very targeted direct mail campaigns, according to Alice Hegedus, SAS' manager of marketing promotions in Jamaica, N.Y.

Using the account profiles, Hegedus can identify specific segments of the market,

See **SALES** page 33

INSIDE

Software International Corp. adds an accounts receivable package to its Masterpiece series of finance packages/**33**

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- Syncsort upgrades its Syncsort DOS sort-and-merge program
- Uccel expands its Infopoint series with five software programs

For more on these and other new products, see pp. 93-117.

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Someday, our children will be able to share information, anywhere, anytime and in any form as easily as we use the phone today. At Northern Telecom, we call this vision the Intelligent Universe,* and we're already building telecommunications products to make it a reality.

Recently, the global telecommunications industry established a set of standards called Integrated Services Digital Network, to help guide the future of telecommunications.

In concert with you our customer, we're fully committed to applying the principles of ISDN. After all, these principles are but another step on the way to our vision.

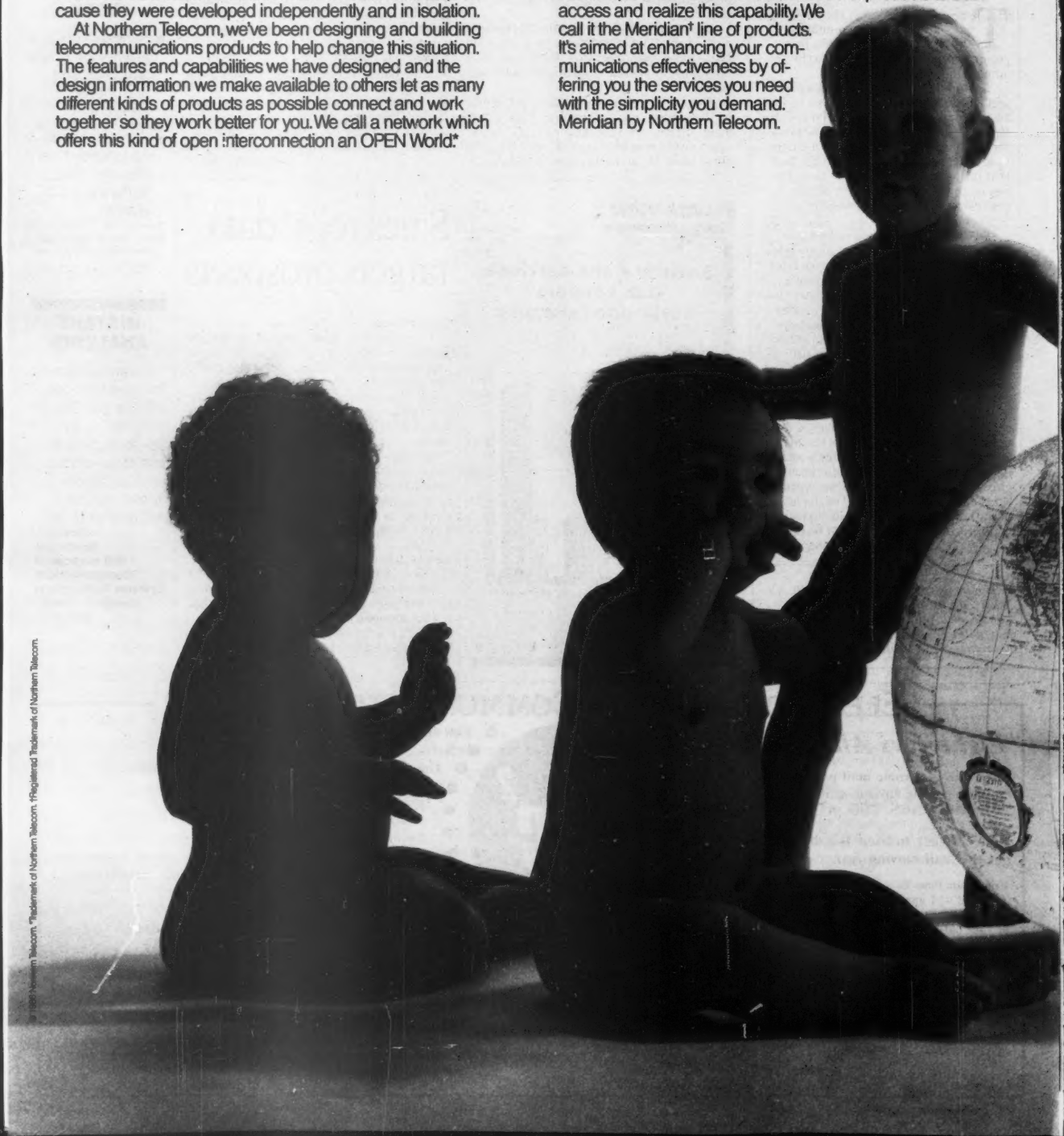
INTEGRATED—People in different parts of the world have different customs and speak different languages. That's because they were relatively isolated, and their cultures developed independently before the days of radio, television, telephones and fast, easy transportation. Sometimes, it's hard to communicate.

Similarly, computers and other equipment made by different manufacturers often find it hard to communicate, because they were developed independently and in isolation.

At Northern Telecom, we've been designing and building telecommunications products to help change this situation. The features and capabilities we have designed and the design information we make available to others let as many different kinds of products as possible connect and work together so they work better for you. We call a network which offers this kind of open interconnection an OPEN World.*

SERVICES—You don't need to understand what makes a telecommunications network tick to use it. For you, the network is just the communications services you need. And of course, the actual telephone or terminal you use is one means of accessing such services.

At Northern Telecom, we have defined and are building into the network a tremendous capability for the provision of services, and we have introduced a line of products to both access and realize this capability. We call it the Meridian† line of products. It's aimed at enhancing your communications effectiveness by offering you the services you need with the simplicity you demand. Meridian by Northern Telecom.



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DIGITAL—Most people find that the best approach to solving a problem is the simplest approach. In telecommunications, the simplest way of carrying information is to convert it to a series of 1's and 0's—a digital bit stream.

A digital bit stream can mean anything—it can be your voice, a letter, a television picture, or the manufacturing diagrams for a new car.

At Northern Telecom, we've been designing and building telecommunications products based on the simple digital bit stream for two decades. We call a network that handles all information in digital form a Digital World.*

NETWORKS—In sports, a winning team starts with a good game plan, and adapts it in real time based on the changing flow of the game.

Up to now, telecommunications networks have followed a very static game plan. They were built mostly of separate elements to handle predictable changes in needs on a long-term basis. There was almost no way of controlling them in real time, so they provided little current information about overloads or breakdowns or anything.

At Northern Telecom, we have developed a new way of designing and controlling telecommunications networks. It's a game plan for public or private network architects who want to design and run their whole network like a winning team. It also lets networks carry different kinds of information more easily and economically and thereby provide the basis for supporting new services and capabilities for you.

We call it Dynamic Network Architecture.*

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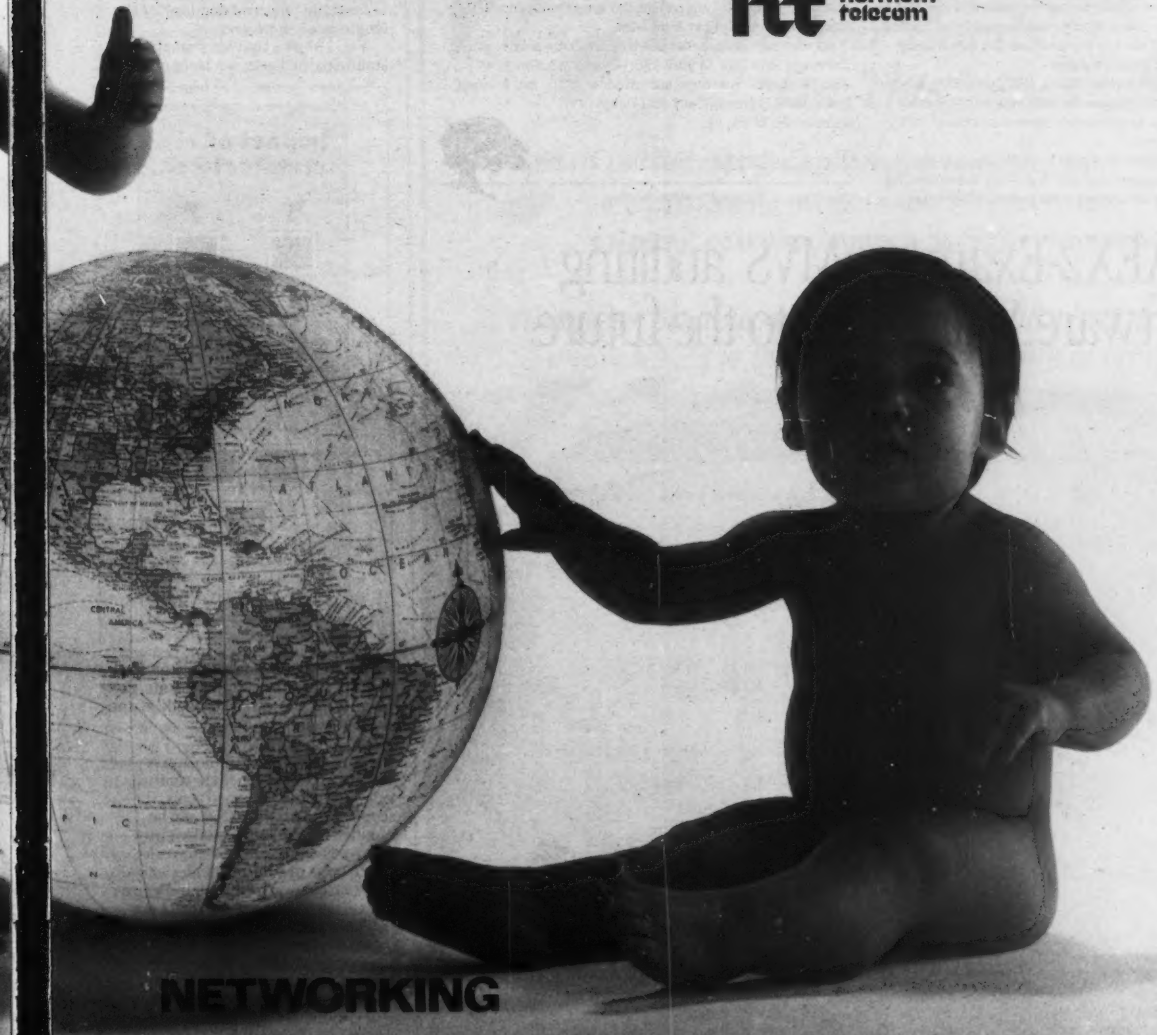

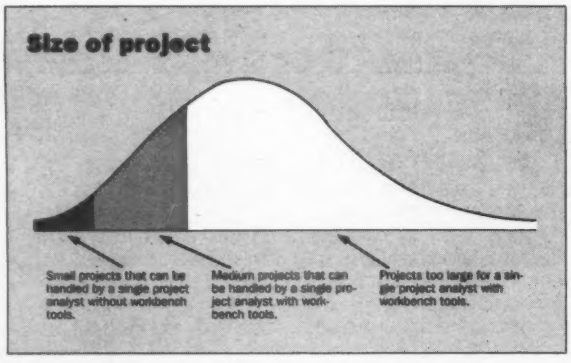

Figure 1. The "natural domain" of the single-analyst project.

One analyst is better than two

From page 27

peated for as many hands as handle the project.

When a single analyst is responsible for a project from inception to completion, there is a minimum scheduling impact. The single analyst performs the different functions of development in the order the development functions are required.

Wearing different hats throughout the life of the project, the single analyst molds his time to the flow of the project. But when multiple parties are involved in the development of a project, the project flows no faster than the collective schedule of the development parties involved. And it is likely that the organization does not optimize the overall scheduling of development around the one project being done by the single analyst.

When a project is built by the single analyst, there is an absolute minimum breakdown of communication (as the analyst does not need to communicate with himself). But in the traditional development life cycle, every time a project changes hands, there is an opportunity for miscommunication.

Single-project analysts, then, have great potential for a level of productivity, especially when the analyst is aided by the powerful tools of the workbench that are becoming available more frequently every day. The coupling of the single analyst with workbench tools has the exciting prospect of a level of productivity previously unachieved in systems development.

Recent workbench software productivity tools have included process analysis and decomposition aids, high-level data modeling aids, I/O verification aids, automatic code generation aids, automated dictionary interfaces and so forth.

Fig. 1 illustrates what can be termed the "natural domain" of the single-analyst project.

Fig. 1 shows that very small- to small-size projects can be handled by the single analyst with no automated workbench tools. Once the analyst begins to use workbench tools, the scope of the projects that can be handled by the single analyst increases considerably. With workbench tools providing much clerical support, the analyst can handle projects of up to moderate size.

The question then becomes, Can't the tremendous productivity leverage that is possible with a single analyst with workbench tools be applied to larger projects? The answer is yes, under the right circumstances.

The productivity potential of the

See ONE page 31

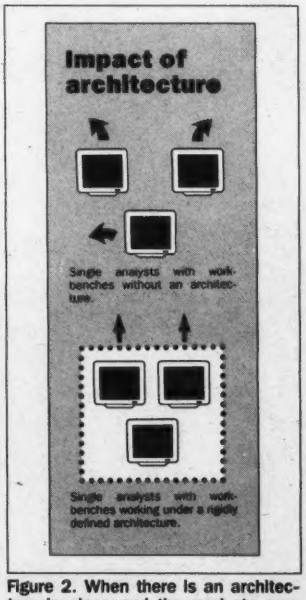

Figure 2. When there is an architecture in place and the analysts conform to it, the analysts work in tandem.

Chances are you don't currently audit your operating system—even though it's ultimately in control of information used to manage your organization. And for good reason.

For the most part, you don't audit the system because the software is just too complex. Then too, certain hard data on system controls is usually unavailable. And a manual review would take weeks to perform, require outside experts, and cost too much.

Those are some of the main problems AEX2-Examine/MVS software is designed to solve. This new software package now makes it possible for you to get the information you need to effectively analyze your MVS environment. So when top management asks how you know your data center business controls are working, you'll have the answer.

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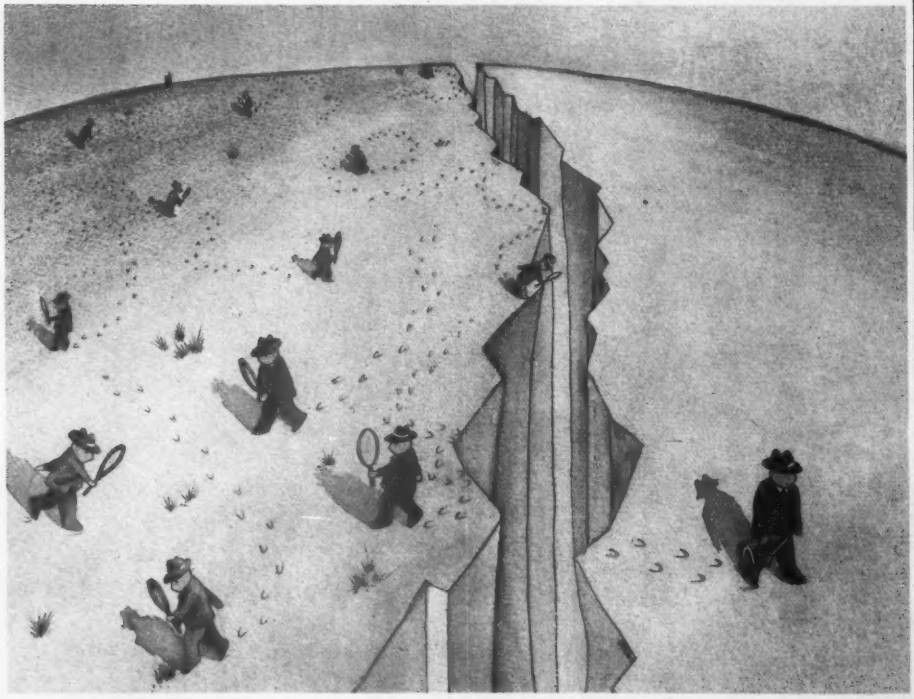


One analyst is better than two

From page 30

single analyst using workbench tools can be enjoyed for multianalyst projects of considerable size, if the following hold true:

- There is an architecture under which all analysts work.
- There is discipline in the conformance to the architecture.

The architecture that serves to tie different single-project analysts together successfully should, at the least, exhibit the following characteristics:

- The scope of the architecture is clearly defined.
- There is a conscious separation of primitive and derived data.
- There is support for different levels of conceptual modeling, and those levels of modeling are kept distinct.
- There is a formal recognition and support of the "system of record."
- The orientation of the operational is toward the major subjects of the enterprise.
- The end-user extraction and derivation algorithms are formally outlined.

The failure to create a sound architecture and thus have the organizational commitment and discipline to conform to the architecture results in many problems:

- On-line performance difficulties.
- Redundancy of code and data, which can result in massive diseconomies in the consolidation of system development and maintenance.
- Inconsistent processing and processing algorithms.

Working in concert

In short, without a soundly constructed architecture, single-project analysts working on a large project may stumble onto many kinds of problems. The great productivity potential that is made possible by the single-project analyst's use of workbench tools can be short-circuited if the analysts do not work in concert.

However, when the architecture is properly constructed and there is widespread conformance to the architecture, the full benefits of productivity can be carried over from the single-analyst project to much larger projects with individual analysts working on the project.

Fig. 2 (page 30) shows two groups of single analysts using workbench products. In a case in which there is no architecture, the analysts are not working in concert with each other. Indeed, they are probably working at cross-purposes, and the very power of the workbench tools allows this conflict to accelerate at a rapid pace.

But when there is an architecture in place and the analysts conform to the architecture, then the analysts work in tandem with each other, enjoying unprecedented productivity. The architectural conformance of the analysts is the analogical equivalent of harnessing a team of horses. When the horses are harnessed and working together, the team is capable of hauling quite a load. But when the team is not harnessed and each horse pulls its separate way, only small loads can be handled.

The establishment of an architecture is the first objective in the face of single-project analysts working together on a large project. But once the architecture is established, what is meant by conformance to the architecture? Conformance to the architecture means, at the least, the following:

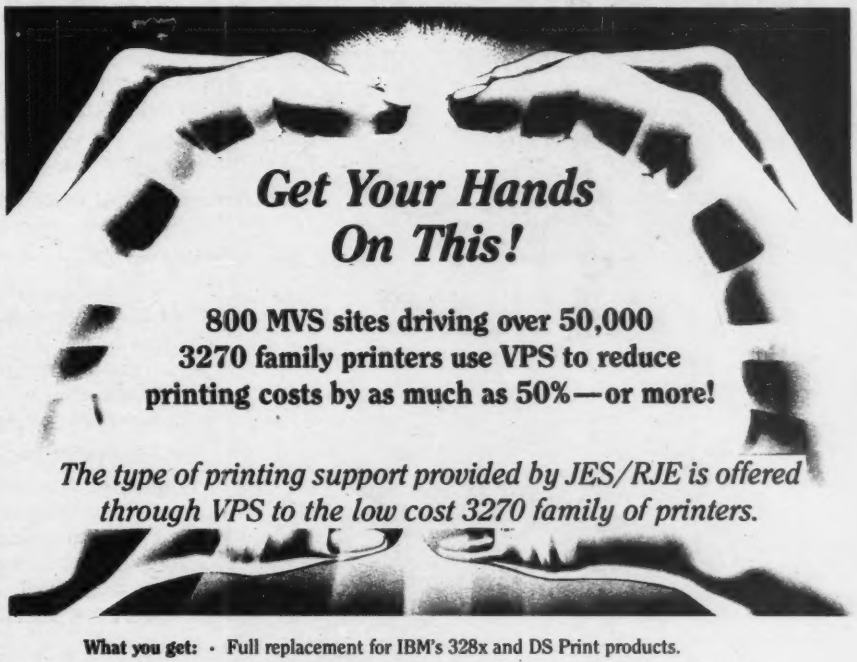
- Deliberate use of existing code.
- Deliberate non-re-creation of existing code or data.
- Conscious preparation of code not just for immediate requirements but for future requirements as well.
- Semantic discipline in the transformation of data and data structures throughout the different levels of the data architecture.
- Strict separation of primitive and derived data.
- Discipline in the extraction and derivation of end-user data.

The establishment of an architecture is the first necessary step in channeling the energies of single analysts into the same path. But conformance to the architecture is a second necessary step.

In summary, the single-project analyst using workbench tools offers great prospects for productivity both from the standpoint of using the automated tools of the workbench and from the economies of generalization that can be achieved. But even in the face of tremendous productivity potential, the single-analyst project is limited to projects of limited size.

To use workbench technology to address large projects requires that multiple single analysts be involved. But the successful involvement of multiple analysts requires that an architecture be in place and that the architecture be conformed to with a high degree of discipline.

> ***"The establishment of an architecture is the first necessary step in channeling the energies of single analysts into the same path. But conformance to the architecture is a second necessary step."***



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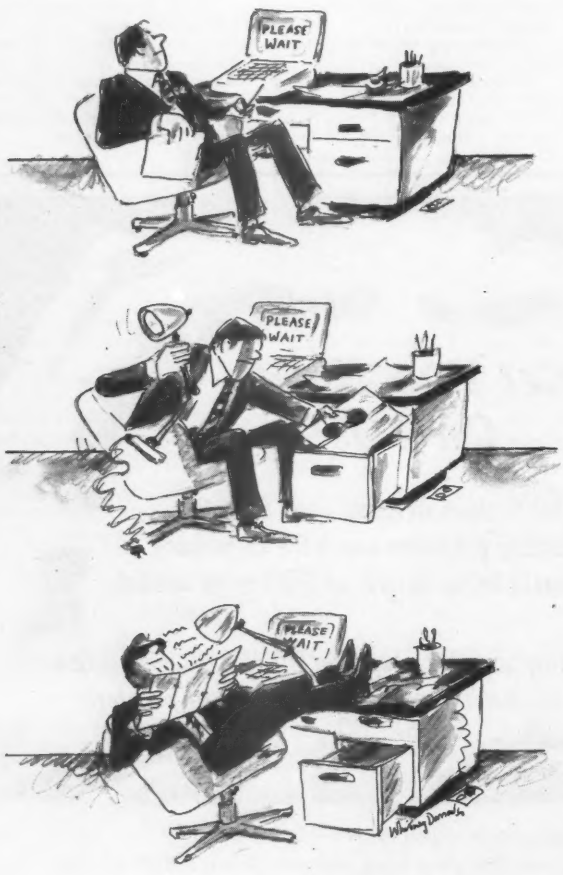

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Sales reps' data targets prospects

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such as Washington, D.C.-area travel agents who handle the kind of business travel that SAS covets. "I don't want to send a $1.50 brochure about SAS business travel to a travel agent who specializes in tours," she says.

By sending out 100 targeted brochures rather than 1,200 in scattershot fashion, Hegedus says, she saves enough money to pay for the Marketing Information and Communication System (MICS), custom-developed by Integrated Marketing Corp. of Rockville, Md.

Integrated Marketing recently began to market the MICS software as a commercial product for use on IBM System/36 minicomputers as a distributed processing system.

The vendor's president, Brian Keedwell, says the MICS software provides a highly structured format for sales representatives to create a data base of information gleaned from their sales calls.

After visiting prospective clients, sales representatives fill out an account profile card. Data from the cards is keyed into a microcomputer at the local sales office and then transmitted to the minicomputer for editing and batch processing, which updates the data base.

The data on customer needs and buying practices can be retrieved for planning, market analysis and targeted mailings or downloaded to a micro for spreadsheet graphics, Keedwell explains.

He says the "knowledge base" is an important precursor to the eventual creation of an expert system for sales and marketing.

"After visiting prospective clients, sales representatives fill out an account profile card. Data from the cards is keyed into a microcomputer at the local sales office and then transmitted to the minicomputer for editing and batch processing, which updates the data base.

At Detroit Edison, the utility's marketing department is installing MICS as a pilot program. The utility finds that it is facing increasing competition from oil and natural gas dealers for business customers and must beef up its marketing force, according to J. James Roosen, a division manager.

"We need something to monitor and guide employees on where they should spend their time," according to Roosen. Furthermore, the marketing engineers using MICS will be able to report such intelligence as, he says, "What energy decisions are being made, who is making them and what is the time frame? How seriously are prospects considering our competition?"

The big challenge for SAS and Detroit Edison, as well as Integrated Marketing, is to overcome resistance from some traditional sales representatives. Officials acknowledge that it is difficult to get some employees to participate in the MICS, because some sales agents dislike using computers and filing reports.

Resistance to the system diminishes once employees see how the marketing information helps them to find good sales prospects, the marketing officials say.

A pilot program for MICS costs $5,000 to $20,000, depending on the size of the client and the modifications made to the software modules; actual operating costs for a licensed system range from $2,000 to $3,000 per sales representative per year, the vendor says.

Masterpiece gets third package

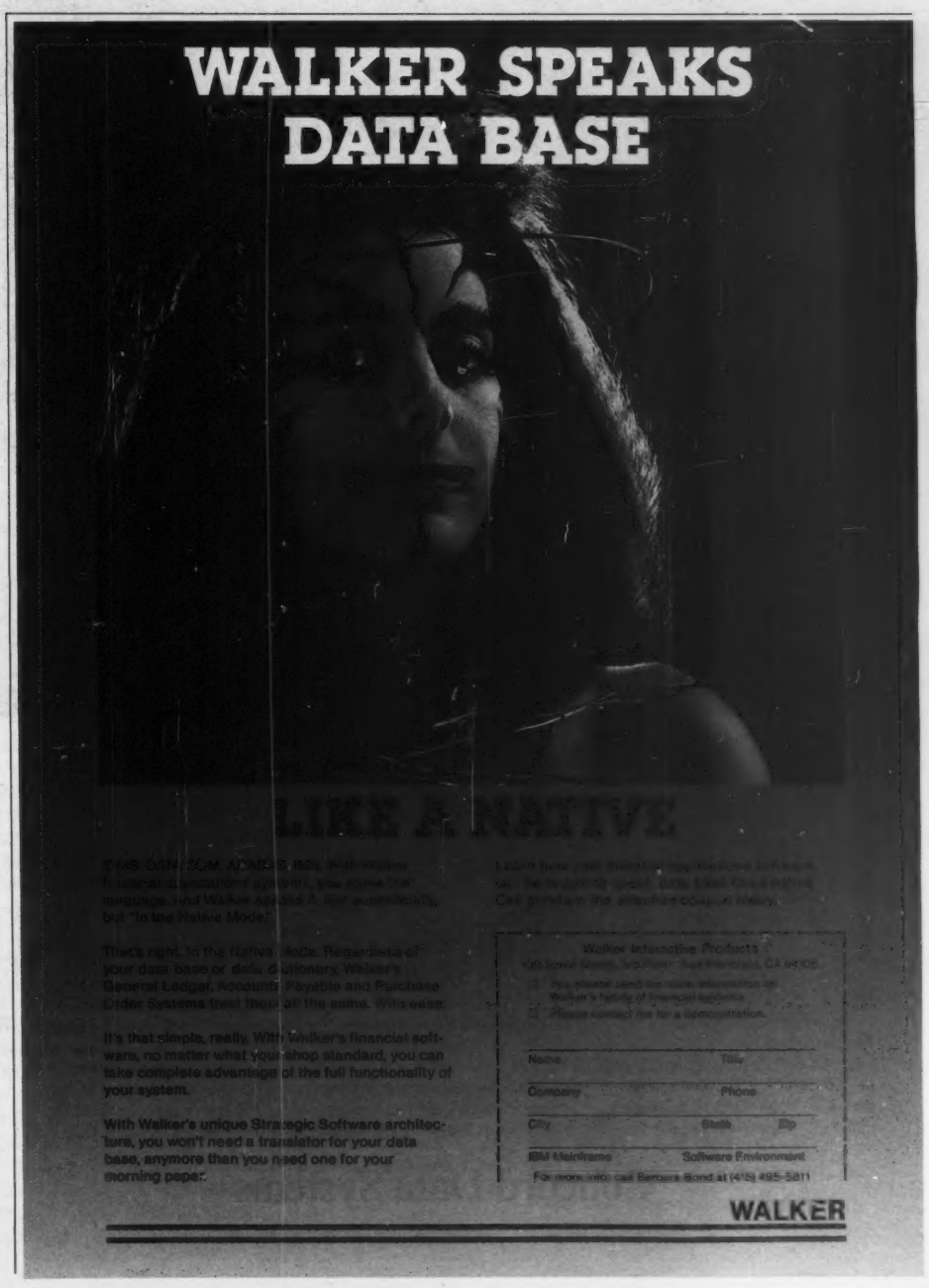
ANDOVER, Mass. — Software International Corp., the software division of General Electric Co., introduced the Accounts Receivable package as the third in its Masterpiece series of financial accounting packages.

General Ledger & Financial Reporting and Fixed Assets packages are already available in the integrated series, with the Accounts Payable and Purchase Order packages to be added later this year, said Frederick J. Lizza, manager of product marketing.

The Andover, Mass., vendor introduced the Masterpiece series in 1985. It was designed to run on IBM 3080 and 4300 mainframes and on the IBM System/38. The packages share a common on-line environment and system manager, as well as several user-oriented facilities, such as Masterquery, a fourth-generation inquiry and reporting tool, and on-line Help, according to company spokesmen.

The Navigation facility allows users to move freely from screen to screen, either within an application or between applications.

The mainframe version of the Accounts Receivable package retails for $70,000 and is available immediately.



Social security down under

From page 27

to what benefits they receive.

Dependent children, for example, are listed by name with their parents in the on-line system even though the parents as a group are listed in different or sometimes overlapping benefit programs, Bolt said.

In New South Wales, the inquiry system processes six transactions a second from 700 terminal users, searching records of a total of 1.7 million clients. The number of users is expected to grow to 1,500 by the end of the year, but Bolt says the system is currently overconfigured with three copies of the Model 204 and will be able to absorb the growth.

Bolt's office ran a test of the on-line system using IBM's Teleprocessing Network Simulator and two of the department's 5880 Amdahl Corp. mainframes. With one mainframe generating transactions from the equivalent of 400 users, the second was able to process them at a sustainable rate of 8 transactions per second using one Model 204, Bolt said.

The on-line system "uses the relational qualities of Model 204. Our records don't contain pointers to other records," Bolt said. The system arranged in a logical rather than hierarchical or networked fashion.

Bolt quickly concedes that the Model 204's transaction processing and quick response times result in part from the design of the data base itself. The department is managing a limited amount of information, and the inquiry system files contain redundant information found in the batch program files.

The files of the inquiry system were designed as a superset of all the identification information in the batch files so that client information could be located with a variety of identifiers, Bolt said.

Once a client has been identified, the terminal user can use the keys in the on-line system to gain access to updated information in the batch files, he added.

Bolt said the Social Security Department system lacked some relational features. A system with referential integrity would check for the names of parents of dependent children before creating a new file on dependent children. Under E. F. Codd's (of the "Relational Institute") model, this kind of foreign key validation would happen automatically, but under the Model 204, it must be programmed manually into the system, he said.

> ***'Our primary concern right at the start was design. If we did the design wrong, we wouldn't be able to find people quickly.'***
>
> — Tony Bolt
> Australia Department of Social Security

Also, because of the simplicity of its design, the on-line system requires few I/O transactions, which speeds the overall transaction rate, according to Bolt.

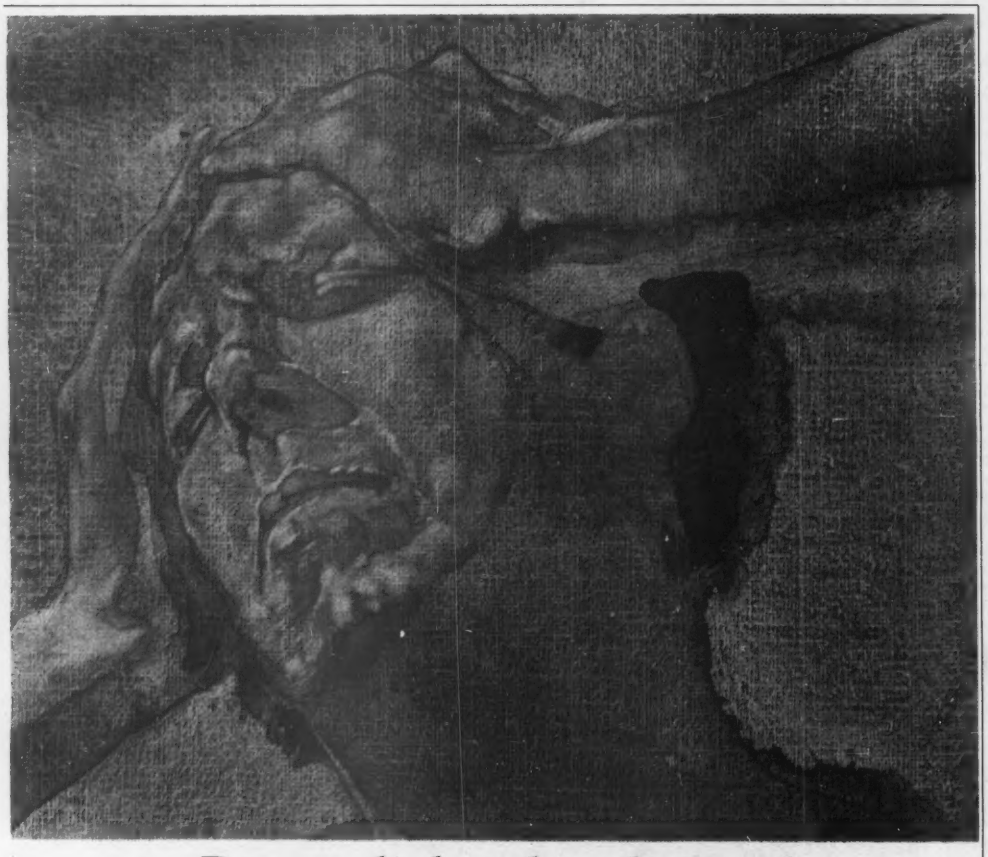
"Our primary concern right at the start was design. If we did the design wrong, we wouldn't be able to find people quickly," he said.

Quicker than Cobol

Bolt said about 60 of the department's 400 programmers have been trained to use CCA's User fourth-generation language and that they code programs in it much more quickly than in Cobol. But he added that the design of a program is more important than the coding and takes just as long.

Bolt noted that User commands are embedded in the Model 204 nucleus and that the Model 204 has its own VTAM interface, eliminating the need for a teleprocessing monitor or CICS. With these features, programmers using User "access the data base very easily" and can develop programs using the Model 204's editor and other development facilities.

Bolt plans to bring additional functions on-line, including a client registration system that would prevent cheating by recipients who register for benefits at different locations in the same day. Eventually, Bolt said, he would like to see on-line benefits processing.



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SYSTEMS & PERIPHERALS

HARD TALK
Donna Raimondi

How large can the 3090 grow?

IBM's largest commercial system, the 3090, is without doubt the box of the decade. IBM says so.

The Blue giant will not sell a bigger, fancier system until sometime in the 1990s, it says, despite speculation by IBM-watchers that there is a next-generation Summit system due sometime in 1988 or 1989. It will not have to release a new system — because the 3090 has within it all the space it needs to grow and change, an IBM manager says.

IBM is predictable in high-end systems announcements. It introduces changes of primary importance in the fourth quarter and ones of secondary importance at the end of the first quarter. These announcements coincide with factors like customer budgeting cycles and tax credit benefits. This has been true for the past seven years, and people inside IBM who should know say it will continue to be true in the future.

Customers can assume a 15% to 20% improvement each year in price/performance on the 3090. Many of the factors that allow such improvements were built in before the system was introduced.

"We announce conservatively. We couldn't stand to have it not perform as advertised," is the way one IBMer puts it. "Then we make it more powerful, more reliable. For example, in February of '86 we took a 10% pricing action on the 3090," he says. "We don't like to take a 10% action. We should have taken 7%, but last year was not a great year for IBM." Even Big Blue has to

See **HOW** page 44

Raimondi is a Computerworld *senior writer.*

Motorola unveils line of Unix, VMEbus-based supermicros

By David Bright

SCHAUMBERG, Ill. — Aiming to provide "maximum flexibility" for business customers, Motorola Computer Systems recently announced a line of supermicrocomputers using two industry standards: the Unix operating system and Motorola's VMEbus.

Both systems are built around parent company Motorola, Inc.'s 68020 microprocessor. The Vision/32 system hosts up to eight users, and the System 8000 supports up to 32 users.

"These new products will provide maximum flexibility and confidence for customers frustrated by proprietary computer systems that lock buyers into single vendors," declared John Mitchell, president of Motorola. "They also address the needs of customers who have found that tying together stand-alone workstations can be difficult and expensive."

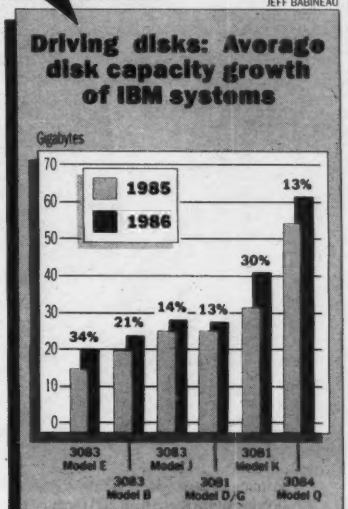
Despite Motorola's enthusiasm, analysts do not expect the two new systems to make big waves. Unix paired with the VMEbus is "not a particularly unique combination," said Elizabeth Levy, who tracks supermicrocomputers at Dataquest, Inc., a San Jose, Calif.-based market research firm.

She offers Alpha Microsystems, Inc.'s new 68020-based AM-2000 supermicrocomputer as a recent example. Introduced in April, that system uses both the VMEbus and Unix. (Although Alpha Microsys-

See **MOTOROLA** page 40

DATA VIEW

JEFF BABINEAU



Information from a Computer Intelligence Corp. analysis of a 10,000-site data base in March.

Alliant offers bundled FX/1 configurations

By Donna Raimondi

Alliant Computer Systems Corp. has started to bundle configurations of its FX/1 minisupercomputer.

Two configurations of the system are available. They cost $99,500 for an eight-user version and $130,500 for a 16-user system.

"We are targeting these packaged systems to the senior scientist who wants his own system," said David Burns, a spokesman for Alliant. They are geared to Fortune 500 companies' research laboratories, university professors and government labs.

"This is for people with their own $100,000-or-so budget who are frustrated with having to share computer resources," Burns added.

"The FX/1 for under $100,000 is a pretty low entry-level cost," said Tom Henkel,

See **ALLIANT** page 40

INSIDE

Advanced Control Technology, Inc. optimizes a multiple processor, VMEbus-based system for real-time applications/**40**

NEW THIS WEEK

- Plexus Computers, Inc. introduces its Advanced Communications Processor board

- For more on this and other new products, see pp. 93-117.

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TOWER SYSTEMS INTERNATIONAL

Cray Research, Convex agree to exchange hardware patents

'Routine' procedure could help both firms

By Donna Raimondi

Cray Research, Inc., the supercomputer company, and Convex Computer Corp., which makes what has been referred to as a Crayette minisupercomputer, have signed an agreement under which each company will exchange all of its issued and pending patents.

"Cray has followed our development and has always been interested to see what we have done so they could detect patent infringements," said William C. Bock, chief financial officer and vice-president of finance at Convex. "We have had a good relationship, and we don't see each other as competition. This agreement will be in both our interests and protect us from patent infringement possibilities," he said.

A Cray spokesman said it was a routine cross-licensing procedure that will protect Cray in the future. Cray and Convex agreed to license only their existing hardware patents. "The fact that we allowed infringement on our patents in the past would hurt us in the future if we tried to protect ourselves. So by giving today's technology away, we protect later technology," he said.

The agreement does not open up any future developments for either party, said supercomputer analyst Jeffry Canin at Hambrecht & Quist in San Francisco. Canin said Convex marketing efforts will benefit the most from association with Cray.

"Convex has quietly filed for public offering, but I do not expect to see the stock issue take place until the third quarter. Convex will clearly benefit from the publicity."

No fees, royalties involved

The agreement involves no fees or royalties, Bock said. Convex is interested in being the low-end supercomputer supplier associated with Cray, he added. At Technologic, Inc.'s recent financial outlook seminar, Advanced Computer Systems: The Financial Outlook, held in Boston, Convex President and Chief Executive Officer Robert Paluck indicated he had received assurances from Cray that it would not develop entry-level systems that might compete with Convex.

However, people should not read into this statement that Cray considers Convex to be its low-end supplier, Canin said. "Cray set its product development cycle in stone long ago. It absolutely will stay independent. Cray won't come out with a low end, and it won't condone one particular vendor's system as a low end, either," Canin said.

Cray will get immediate access to Convex patents and vice versa. "We believe we have significant technological value for Cray. Cray has basic supercomputer technology patents, and Convex has extended many of the Cray-like technologies into more sophisticated versions of certain functions," Bock said.

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Eye scanner security bows

By Donna Raimondi

BEAVERTON, Ore.— Eyedentify, Inc. has announced a retinal scanning biometric security device said to provide positive identification for persons seeking access to secured areas.

The Eyenet System 8600 allows an individual to enter his personal identification number on a reader keypad, at which time a waveform representing the real-time eye scan is matched with a stored-eye signature. Upon recognition, the system automatically activates the type of security mechanism used and the person is granted access.

"We use the Eye [7.5 Eyedentify, an earlier model of the 8600] at the guard door, the most important door in our place," said Frank Campbell, president of One Safe Place in Dallas. The firm has safety deposit boxes, media and art vaults and is doubly secured by a proximity card system and an Eyedentify retinal scanner.

The Eye eliminates the need for photographic identification, Campbell said.

"With photos, a man can grow a beard or mustache and a woman can dye her hair or come in with curlers and a scarf, and few people can positively identify them. But the retinal scanner is more accurate than fingerprints," he said.

The Eyenet system 8600 consists of a controller, which costs $9,995, and up to 32 readers, costing $5,995 each, that can be connected to the controller via a dual-looped RS-422 network.

The readers can be placed up to 1,000 feet apart. Campbell uses only one reader on his older system that currently controls access for approximately 1,000 customers. When a system exceeds 1,200 users, he said, a personal computer needs to be added to extend its capabilities.

The system controller contains 1M bit of bubble memory and allows storage of up to 1,800 eye signatures.

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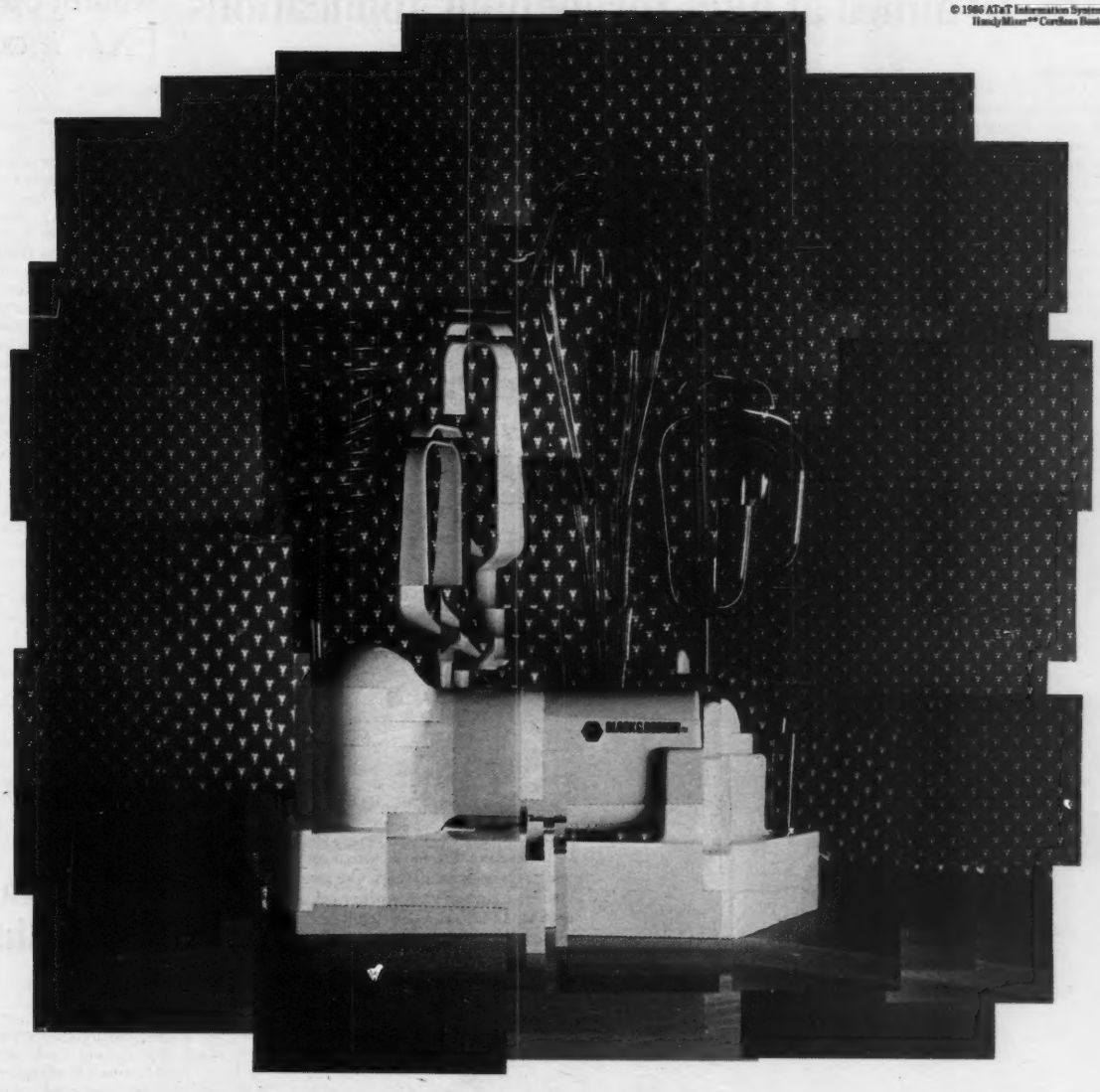

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MPS-10 aimed at high-throughput applications

By David Bright

IVYLAND, Pa. — Targeting scientific, real-time applications that require high throughput, Advanced Control Technology, Inc. has introduced a system using as many as eight Motorola, Inc. 68010 processors.

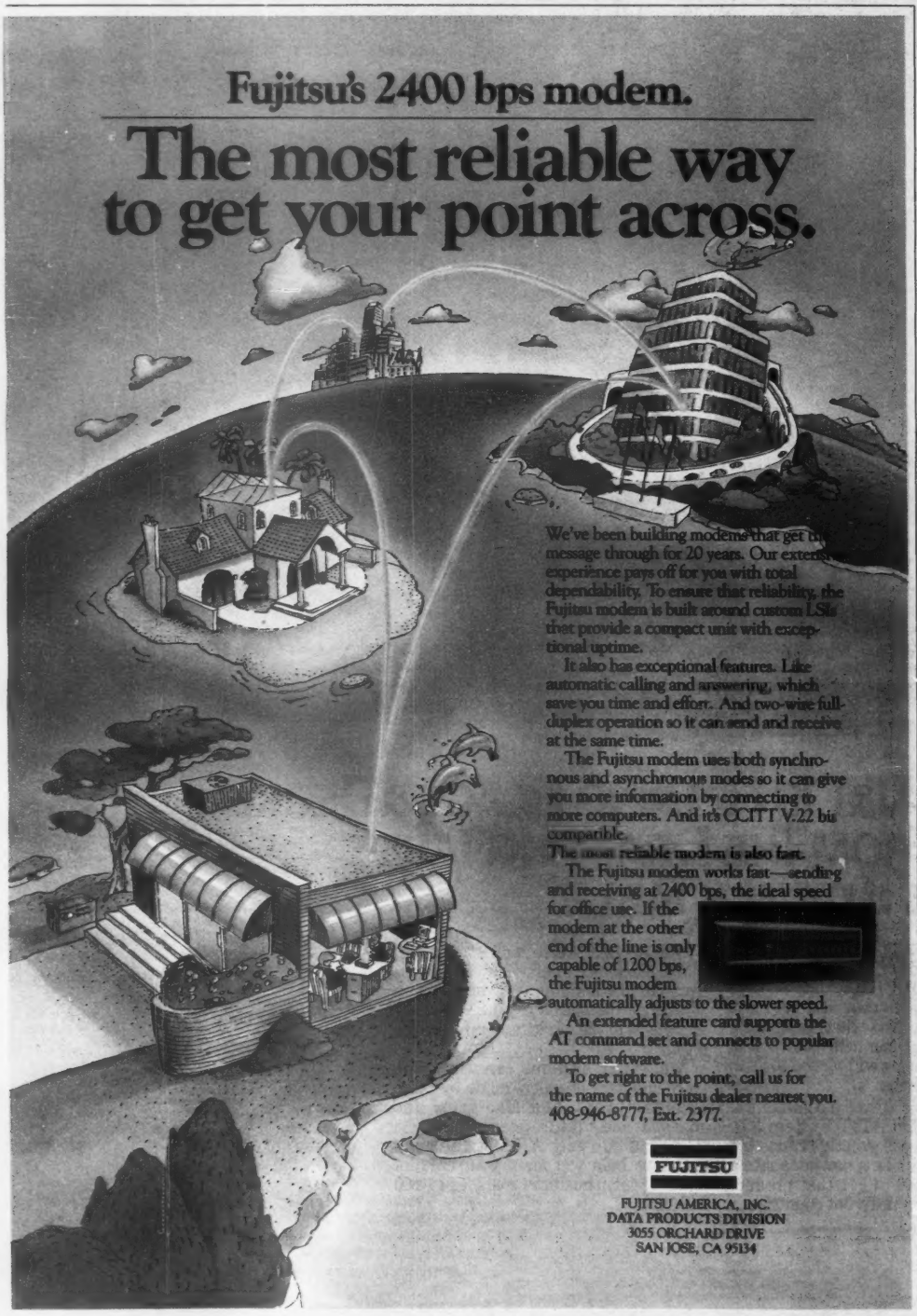
The VMEbus-based MPS-10 is intended for such applications as process control, robotics control and signal processing as well as program development.

According to Vice-President Kenneth Grob, the chief competition for the $30,000 system comes from VMEbus-based machines from General Micro Systems, Inc. and Motorola as well as Digital Equipment Corp.'s Microvax. The MPS-10 uses the Microware Systems, Inc. OS9/68K operating system and network package.

High throughput on processing intensive tasks is gained by breaking each task into pieces and assigning them to individual processors, each of which runs a copy of the operating system, Grob explained.

Each processor board contains a 12-MHz 68010, 512K bytes of dual-ported random-access memory, two serial ports, 128K bytes of erasable programmable read-only memory and an optional floating-point processor.

One processor acts as a system controller, keeping track of the other processors' activities and handling disk I/O.



Alliant offers FX/1 models

From page 37

analyst at the Yankee Group in Boston.

The only serious competition Alliant faces in its market is Convex Computer Corp., Henkel said, even though Alliant claims that Digital Equipment Corp. is its competition. The entry-level cost of either Convex's or DEC's similarly configured systems is significantly higher — starting at about $400,000 — than the Alliant package's cost, he said.

The $99,500 model contains vector and scalar processors, a 138M-byte 5¼-in. Winchester disk, a 5¼-in. streaming cartridge tape, an eight-line communications controller, an Ethernet controller, a video terminal and keyboard, a dot matrix slave printer for the master console, an eight-user Alliant Concentrix license and an FX/Fortran license. Previously, Alliant sold its computers in components; this package would cost about $137,000 if sold that way.

The $130,500 version adds an expansion cabinet, a Storage Module Drive disk controller, a 268M-byte 8-in. Winchester disk and a 16-user operating system license.

Motorola unveils line

From page 37

tems offers Unix, it pushes its proprietary AMOS operating system more strongly.) Motorola's new systems seem to be "just another endorsement for Unix," Levy stated.

"The 68020 systems are really starting to roll out now," added Rich Mikita, an analyst with market research firm International Data Corp. of Framingham, Mass.

For example, one of the latest Unix-based 68020 systems, the P/55 16-user model, was introduced by Plexus Computers, Inc. just last month.

The System 8000 is targeted at general office systems users and value-added resellers.

Prices start at $15,690 for the eight-user Model 200 and at $22,335 for the 32-user Model 400.

Optimized for on-line transaction processing applications, the eight-user Vision/32 system is primarily intended for Motorola's installed base of customers who are running the company's on-line transaction processing software. Prices begin at $17,195.

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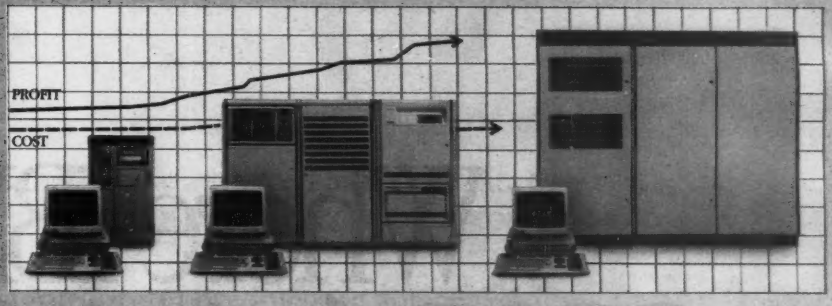

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How large can the 3090 be?

From page 37

boost sales sometimes.

The fourth quarter of this year, then, will not see a big price cut on the 3090. It will see a performance change that, combined with the previous 10% price cut, will lead to the predictable 15% to 20% price/performance enhancement.

Hints abound as to where performance increases can be made. "You can only enhance uniprocessors 20% to 22% per year," is one message from Big Blue that points to more multiprocessor systems in the coming years. Another clue has to do with reliability. IBM is aware that customers are expecting 99.5% reliability on the 3090 now and will soon demand total fault tolerance.

The company is working on 4M-bit chips using the thermal conduction module (TCM) method that could conceivably vastly increase the power of the 3090.

These chips are likely to be ready in about six months, an IBM spokesman implies. One might note that there is room in the system's design for another nine-module TCM unit. When the 3090 was designed, its faster cycle time came from switching the transistor-to-transistor logic to emitter-coupled logic. But that logic change accounts for only 30% of the speed-up. The other 70% comes from changes in the design of the system itself, the spokesman says.

Vector processing is one feature to watch, people inside IBM say. Vector processing needs machines with the internal capacity to move huge amounts of data along lots of multiple paths, and the 3080 system was path-poor. The 3090 has parallel paths at least 64-bits wide already, the spokesman says.

Speaking of being parallel, the 3090's execution and instruction elements are just that; that is, they work simultaneously. The system control element has three lines, compared with one line in the 3080.

Although the operating systems were designed to handle only single instruction streams, the 3090 hardware can handle a five-way pipeline, leading to pretty good guesses as to where some of the improvements will come from in the next few years. Rumors say that a third-quarter MVS/XA announcement this year could unlock some of that potential.

The 3090 channel controller, a reduced instruction set computer, has its own preprogrammed microprocessors. Doing microcode on these microprocessors opens the possibility of changing speed and function as needed during customer migrations.

High-speed buffer

The 3090's high-speed buffer, which is the same size as the 3080's at 64K, may be more than adequate for now. But it may be dramatically different in its next incarnation, because IBM has left plenty of room around it for improvements.

Another potential performance increase of perhaps six or seven times could come from dumping larger and larger amounts of storage into the system's memory chips. This will provide faster-than-cache speeds at cache-like costs.

The power of the expanded storage facilities written into XA will allow users to address 16 trillion bytes of data; at this time, most large customers do not need more than 2 trillion. But the potential for moving whole or working data sets into the memory is there.

New versions of MVS/XA will remove fundamental constraints on growth, IBM says. XA has the capability of supporting 256 channels: IBM has to this point released 96 channels. It can support 16 processors: IBM has so far come up with a maximum of four. It can support 2G bytes of real storage: IBM now offers 128M bytes. Draw your own conclusions as to what 3090 will look like by 1990.

The 3090 is the machine for the decade. It has built-in capacities that can only be hinted at now. But living with the full-blown box when it does come out will not be so easy. How does one adjust from a 15-million-instructions-per-second (MIPS) machine to a 90-MIPS machine? How does one program a box with more microcode than has ever been commercially available before? It will be radically different, IBM says.

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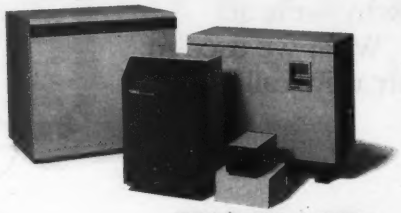

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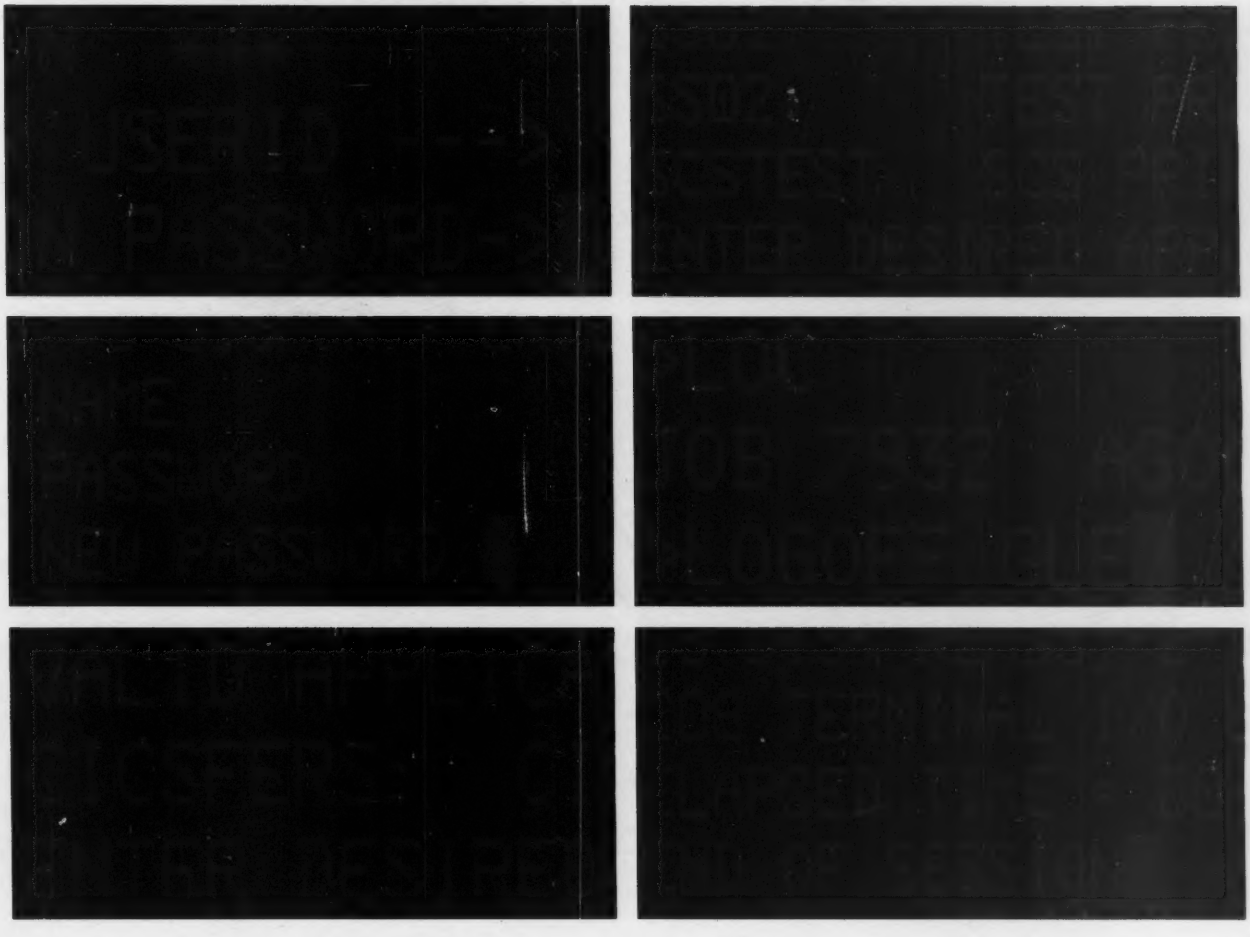

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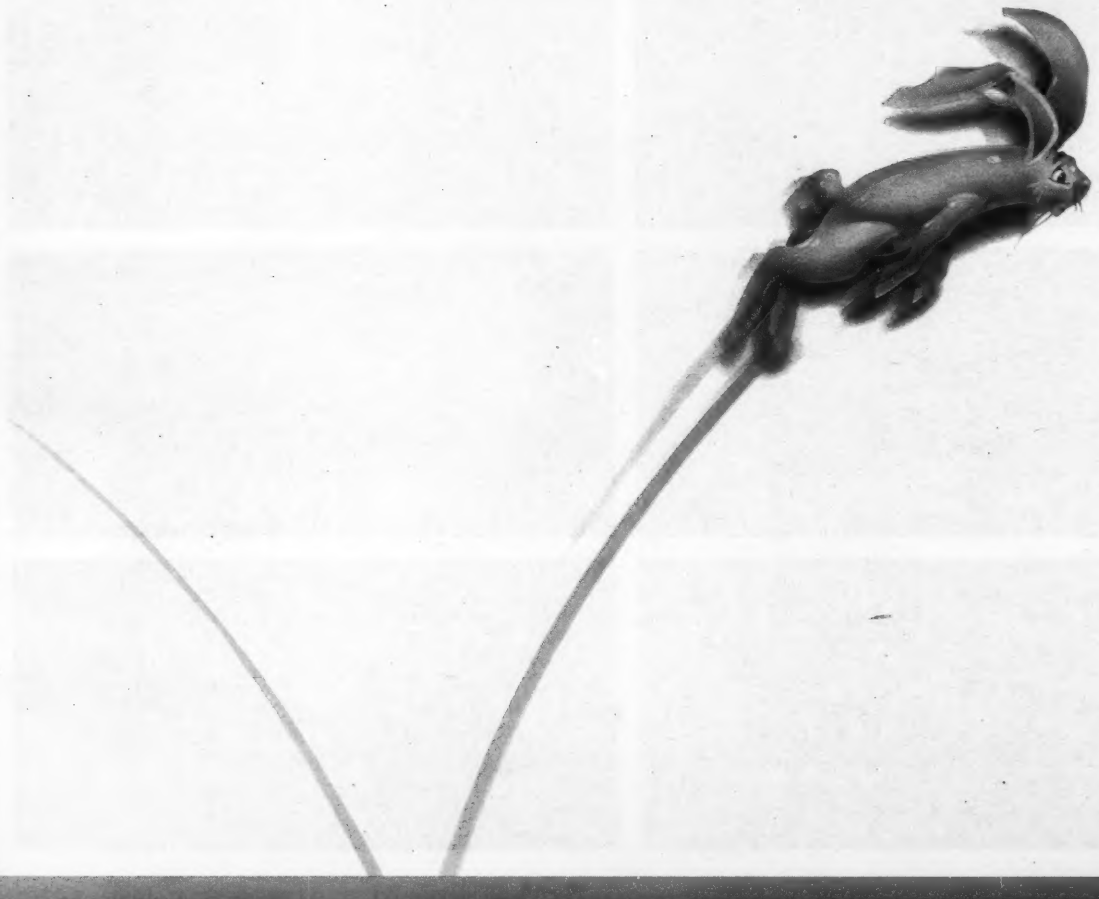

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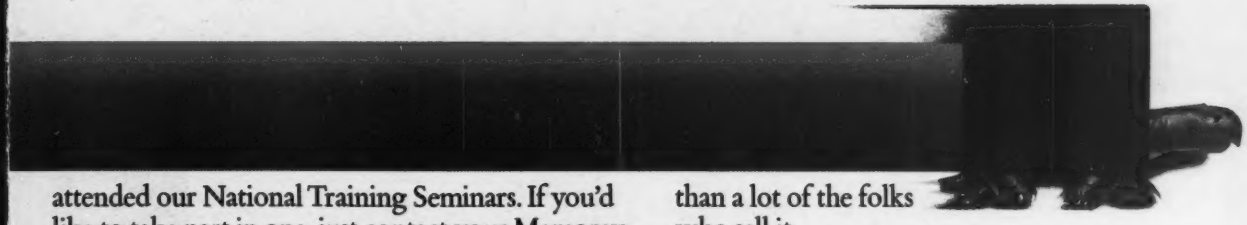

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MICROCOMPUTERS

SMALL TALK
Peggy Watt

Pagemaker put through paces

Hours spent over a hot light table, splicing and pasting crucial slivers of type, painstakingly fumbling with a T square and impatiently counting out and resizing headlines.

These images came to mind when I heard about desktop publishing. Imagine letting a computer handle the measuring and pasting and me keeping wax off my hands and ditching my razor-sharp knife for good.

Oh, large newspapers like *Computerworld* have electronic composing rooms with dedicated terminals hooked up to the reporters' CRTs. But for smaller publications, or free-lancers, electronic publishing has been out of reach.

So the chance to sample the page layout package Pagemaker from Aldus Corp. of Seattle with an Apple Computer, Inc. Macintosh Plus was a welcome introduction to the modern world of publishing. And having done a few company newsletters, I could appreciate the needs and desires of the in-house corporate job shop evaluating desktop equipment.

First, however, I got a lesson in new-user frustration. I wasn't a newcomer to the "computer for the rest of us," but we had to iron out some differences. Maybe Microsoft Corp. MS-DOS isn't as friendly, but when you're used to it, menu-driven-everything can drive you crazy. Anyway, the Mac eventually won and I had to learn patience.

I'm one of those "RYFM" users the dealers growl about (those who don't "read your flippin' manual"). But I was flipping through the manual searching for answers to my page-layout puzzles.

To the credit of both the Macintosh and Pagemaker, someone more familiar with graphic arts and common page design procedures than with the specif-

See **PAGEMAKER** page 53

Watt is a Computerworld *West Coast bureau correspondent.*

'Data pipelines' link 1-2-3 to mainframe, real-time sources

By Eric Bender

CAMBRIDGE, Mass. — A few years ago Donald McLagan was executive vice-president of Data Resources, Inc., a large information services firm, and his customers kept telling him they wanted to use the IBM Personal Computer and Lotus Development Corp.'s 1-2-3 package.

McLagan

McLagan replied with Data Resources' reasons why clients actually needed time-sharing services, like the lack of good ways to get timely data into the micro. "They listened dutifully and began to do more work on PCs with 1-2-3," he recalls wryly.

Then the customers would begin struggling to move all that data into 1-2-3. "This problem had been created by Lotus, and Lotus had done nothing to fix it," McLagan remarks.

Now, as vice-president and general manager of Lotus' new Information Services Division, McLagan has been given the charter to do something about it — building cleaner data highways into Lotus' star analysis package, not only for financial data but for data stored on mainframes and in many other places. The effort will be crucial to Lotus and crucial to future spreadsheet design, he says.

"We want to develop an application pipeline for data to flow into spreadsheets, so it begins to appear in cells and ranges," McLagan explains. Beyond 1-2-3's standard WKS file format, "you need a data exchange capability that comes along with the spreadsheet that is much more specific in terms of where the data is coming from and going to, and that knows about mainframes and knows about real-time data."

This approach would allow data to pop up smoothly and exactly where the user wanted it within a spreadsheet. "You'd obviate the need to deal with files and Microsoft Corp. MS-DOS, which is everybody's nemesis," McLagan says. "You could use it with the Intel Corp. 8088 with 1-2-3, and you wouldn't have to wait for a new operating system."

Microsoft aims to position its Windows

See **PIPELINES** page 56

Hercules graphics card to debut

Successor to popular board supports new mode for text

By David Bright

BERKELEY, Calif. — Hoping to duplicate the huge success of its Hercules Graphics Card, Hercules Computer Technology, Inc. today is expected to introduce a successor to the card.

Called the Hercules Graphics Card Plus, the $299 add-in board for the IBM Personal Computer family uses Hercules-supplied device drivers to enhance Lotus Development Corp.'s 1-2-3 and Symphony, Ashton-Tate's Framework and Microsoft Corp.'s Word. The board reportedly enables a 1-2-3 spreadsheet to be overlayed with a graphics window.

Hercules also slashed the price of its original Graphics Card from $499 to $299. An additional $50 rebate will be offered on that board through August.

The primary added uses for the Hercules Graphics Card Plus will be mixing text and graphics on the same screen and speeding up displays of various fonts and special characters.

Hercules President Kevin Jenkins said that the card's advances are largly due to Hercules' new Ramfont mode, which allows the storage of a greater number of text fonts and patterns in memory. He predicted that this product will set a new standard, much as the Hercules Graphics Card did.

"We want all text mode software to eventually be written for Ramfont," Jenkins declared.

In addition to Lotus, Ashton-Tate and Microsoft, more than 20 other software developers have committed to supporting the Hercules Graphics Card Plus, Jenkins said. While the drivers for the programs written by the three largest independent software vendors will come with the card, other

See **HERCULES** page 52

INSIDE

Audio Visual Laboratories announces a turnkey graphics system based on the IBM PC AT/**52**

NEW THIS WEEK

- Autodesk, Inc. introduces a version of Autocad for IBM 3270 ATs
- Pick Systems releases Mainlink software package

For more on these and other new products, see pp. 93-117.

INSTANT ANALYSIS

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— Donald McLagan, vice-president and general manager, Lotus Development Corp.'s Information Services Division

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What we learned about Houdini, Einstein and

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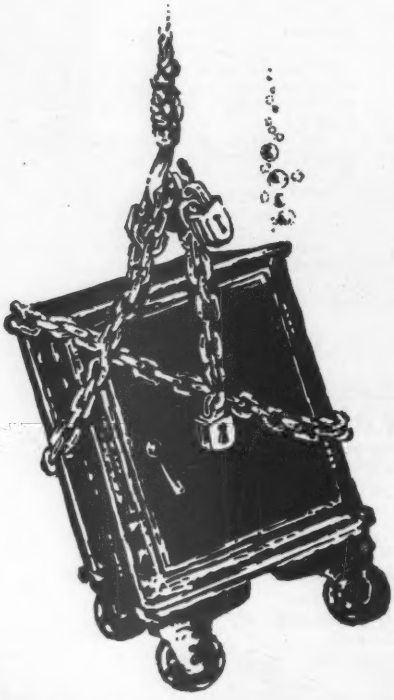

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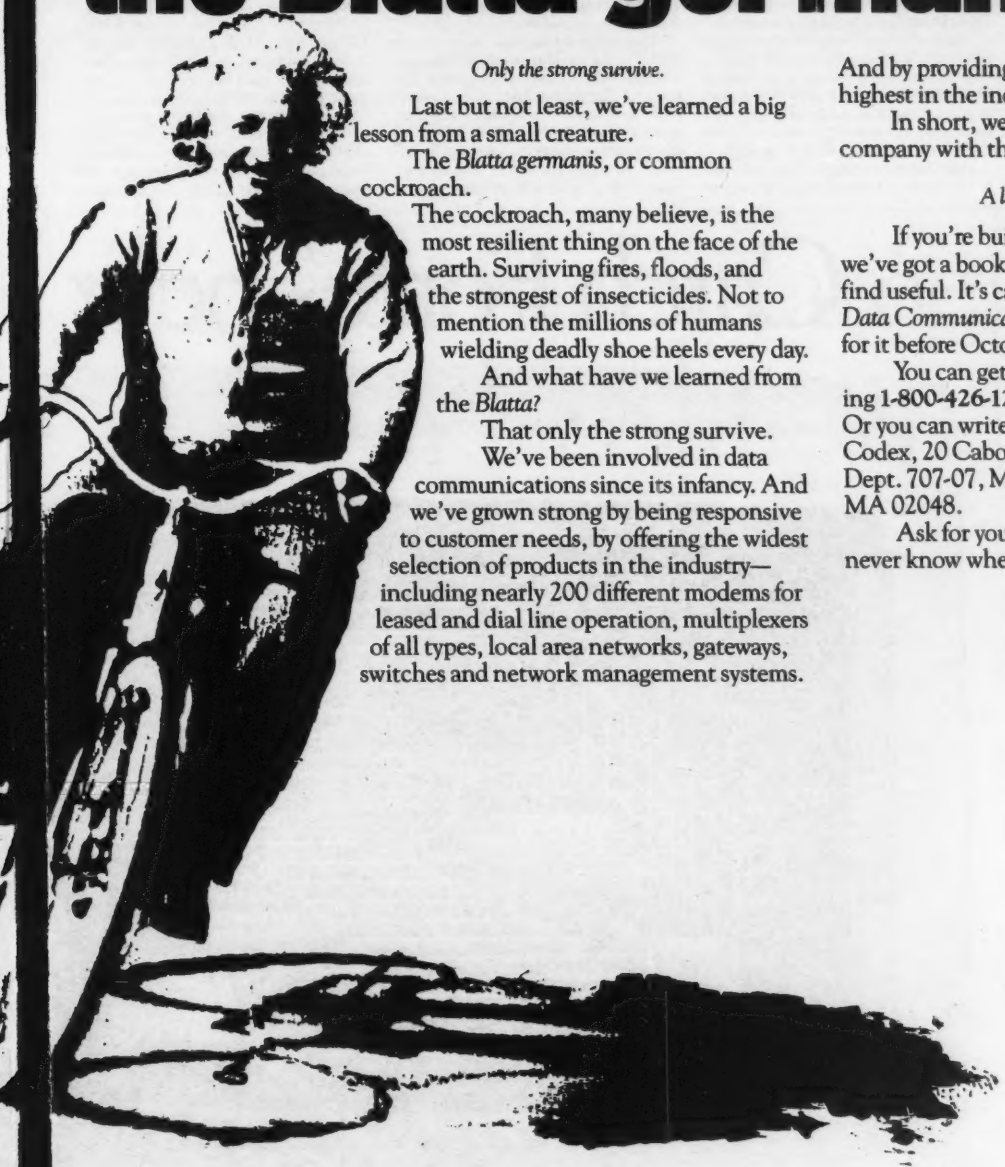

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codex

MOTOROLA

AVL releases PC AT-based Starburst+ graphics system

Turnkey package creates slides, charts and text

By Douglas Barney

TINTON FALLS, N.J. — Audio Visual Laboratories, Inc. (AVL) has unveiled Starburst+, a $32,500 computer graphics and slide creation system based on the IBM Personal Computer AT.

Starburst+ is an integrated turnkey system for creating and producing free-form art slides, charts and text. The system is aimed at audiovisual, marketing and training departments within large corporations and organizations. Key customers include the government, publishers, universities, medical institutions and advertising agencies, the firm said.

One key attribute of Starburst+ is its ability to produce and control multiple images, AVL President Raymond Sozzi said. Multi-image systems can control multiple slide projectors and are most often used for presentations at annual meetings, he added.

According to Sozzi, Starburst+ is a highly flexible system. "We have a text program where you can do text at a local level with any word processing program, and then you offload it to a Starburst+ and enhance the slides that you shoot," he said.

Another advantage, Sozzi claimed, is the system's simplicity. "In a couple of days, the user can literally be up to 80% utility on the system."

AVL's original Starburst package was based on computer systems technology that was licensed from Eagle Computer, Inc. and produced by AVL. Users of the existing Starburst systems can upgrade to Starburst+ for $12,000, which includes new hardware and software.

The main advantage of using an IBM PC AT as the product's base is the increase in speed and the influence of the IBM name upon customers. "It is much faster. It is a performance issue. And certainly in terms of corporate America, which is our target market, the name IBM is very important," Sozzi pointed out.

Although AVL sells mainly turnkey systems, the vendor may sell just the software under special circumstances. "If we go into an environment where there are multiple systems involved, and they already have ATs, we would consider providing everything but the AT itself," Sozzi said.

Starburst+ consists of an 8-MHz PC AT with 512K bytes of random-access memory, a 30M-byte hard disk, a 1.2M-byte floppy disk, a 13-in. color monitor with 720- by 512-line resolution and a digitizing pad. The addition of a film recorder and high-quality thermal and laser printers could push the price of the system up to approximately $70,000, Sozzi said.

Hercules graphics card to debut

From page 49

suppliers will provide drivers for their programs.

Introduced in 1982, the Hercules Graphics Card provides high-resolution monochrome graphics for approximately 200 applications programs. After Lotus' 1-2-3 came out, sales of the Hercules Graphics Card took off, reaching 500,000 in 1985, according to Jenkins. Next to IBM, Hercules is second in the video driver market with an 18% share, according to research from Infocorp.

Lotus officials declined comment on the new board. At Microsoft, however, Charles Stevens, group product manager for word processing, said the Hercules Graphics Card Plus enables Microsoft Word to display sharply defined characters and to run more quickly than any other word processing program.

This is because the system does not have to create graphics characters on the fly; instead, italics, boldface and other font types can be stored on board.

"I think it will be extremely popular with Word users because of its capabilities and the fact that it's very, very fast," Stevens said. According to Stevens, the extra cost of the card should be justified for users who spend at least 80% of their microcomputing time on word processing.

Chip uses 12-bit coding scheme

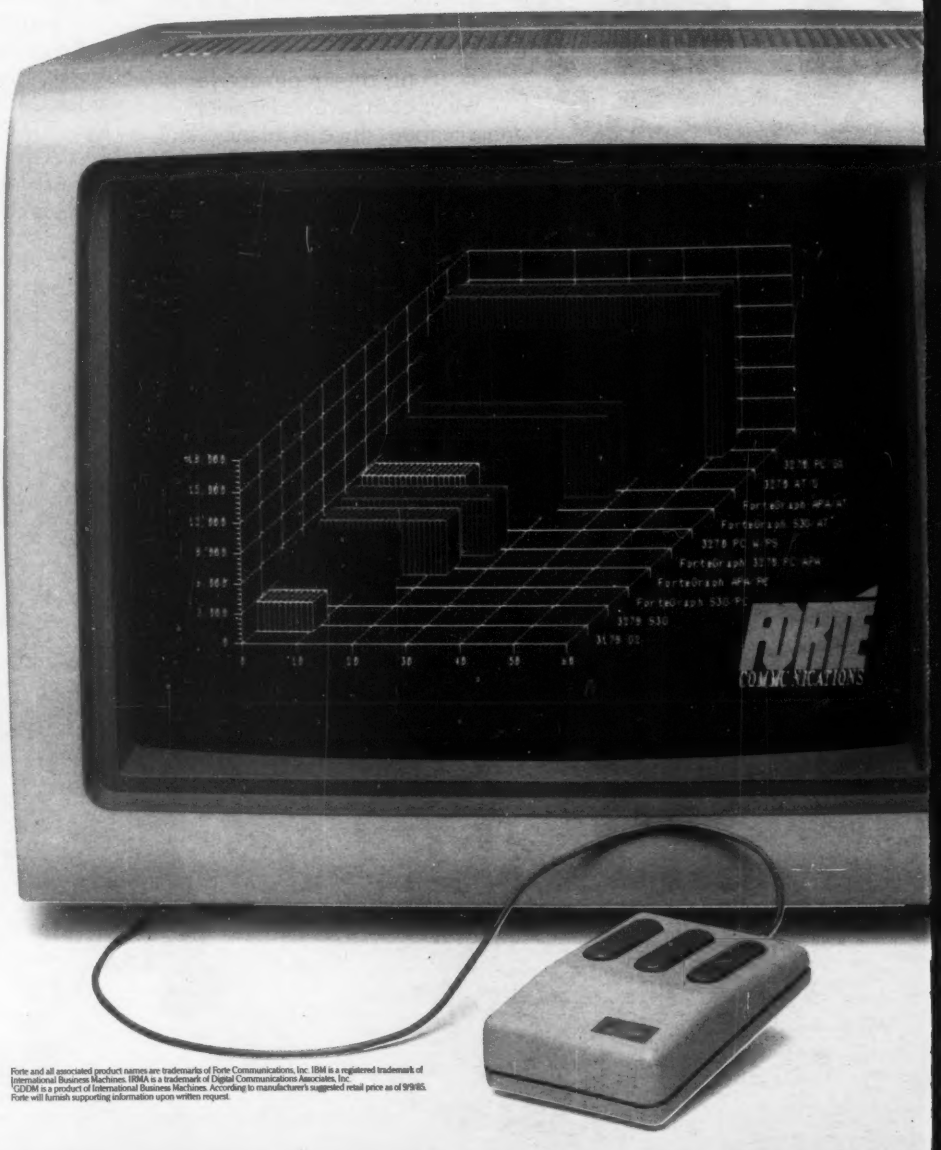
The Hercules Graphics Card Plus is built around a proprietary video processor chip that uses a 12-bit coding scheme, instead of the more common 8-bit scheme.

The scheme reportedly allows up to 3,072 characters to be defined and displayed vs. 256 characters with standard text. Up to 24 full fonts can be displayed simultaneously.

With Ramfont, character size can range from four to 16 pixels high and from eight to nine pixels wide. In text or Ramfont modes, the board supports 720- by 350-pixel resolution; in graphics mode, the resolution supported is 720 by 348 pixels.

In addition to the drivers, the Hercules Graphics Card Plus comes with 25 sample fonts as well as programs for creating and editing fonts and setting character sizes. The card should be available in July.

Catch Forte's new



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Pagemaker put through paces

From page 49

ic hardware and software tools could produce an electronic page layout with minimal reference to the documentation.

But when the page wouldn't print out and I had exhausted my documentation references, I picked up the phone for technical support. The hardware people from Apple declared the problem was the software. The software people from Aldus suggested the problem was the hardware.

Initial denials aside, an Aldus technical support rep helped me install the Macintosh's newest system and finder software on my copy of Pagemaker 1.0, so the program would communicate with all aspects of the Macintosh Plus. (I'm told the problem has since been solved permanently with release of Pagemaker 1.2.)

Hardware and software problem

Further printer problems were solved by swapping printers — it turns out the problem had been *both* a hardware and software one.

And since every page design project, including mine, is done under deadlines, I can assure prospective users that my page layout experiment passed that most important test.

I produced the final, camera-ready copy on an Apple Laserwriter at Laserwrite of Palo Alto, Calif., one of the high-tech job shops springing up since the appearance of the Mac/Laserwriter/Pagemaker team.

A dozen Macintoshes networked to Laserwriters line the walls of the shop; customers pay by the hour (usually a fraction) and by the laser-printed page. That copy goes to the printer.

For corporate use, the $15,000 cost of setting up shop with a Macintosh, Laserwriter and software should pay for itself in designing forms alone. Those who pick up a couple more Macs can be even more efficient.

Obviously, printing can be done either on contract, from laser-printed camera-ready copy, or in-house by more complete job shops.

The pressmen will be delighted to not have to photographically opaque out the lines that invariably appear in cut-and-paste jobs.

Anyone involved with a publication knows the value of having the luxury of making last-minute changes.

Typesetting your own copy has been a lifesaver in the past; being able to make changes on the screen yourself is even better. Changing font size with a few mouse-clicks delights this user.

And despite the threats and promises of IBM Personal Computer publishing software, it's still a Macintosh world at the low end.

Unique interface

The Macintosh's unique interface can be either blessing or curse, and its value depends on your needs. But between simple or practiced graphics produced by Macpaint and Macdraw and the clip-art available from several sources, many basic graphics needs are handsomely met with the Macintosh.

While such graphics interfaces as Microsoft Windows and Digital Research, Inc.'s Graphics Environment Manager attempt to transplant the best of the Mac interface onto the personal computer, the added requirements of memory, mouse, graphics adapter and still-awaited MS-DOS page layout programs are built into the Macintosh. These make it the machine of choice.

There are still some limits. Pagemaker seems to retain some idiosyncracies even in Release 1.2. Despite my command to change fonts in "type specs," the program frequently and stubbornly reverted to its previous settings.

WYSIWYG principle

I'd also swear that the "what-you-see-is-what-you-get" principle doesn't hold true from all viewing angles. Pagemaker offers several: actual size, 70%, 50%, 200% and "fit in window" (for viewing full layouts). Sometimes stuff that I *knew* was straight was out of kilter on the screen, and the proof was in the printing.

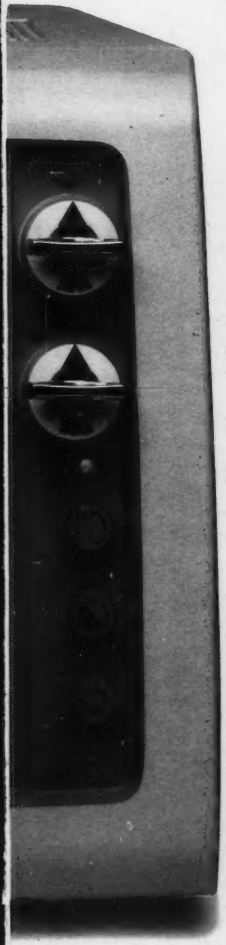
And the practiced eye of my pressman friend, presented with the camera-ready copy, could tell quickly that the print was not typeset. The 300 by 300 dot/in. resolution is a far cry from the 1,500-plus dot/in. resolution provided by most typesetters.

While desktop pubishing zealots argue that only the experts can tell, that's not the point: The finished product is grayer than the eye expects, whether the reader realizes it or not.

So while I can't imagine the nation's daily newspapers sweeping out their dedicated minicomputer systems in favor of Macintoshes, there is at least a finite, ready market in corporate job shops and print shops.

And there's one more thing to say for the Mac method: It's here.

micro to mainframe graphics lineup.



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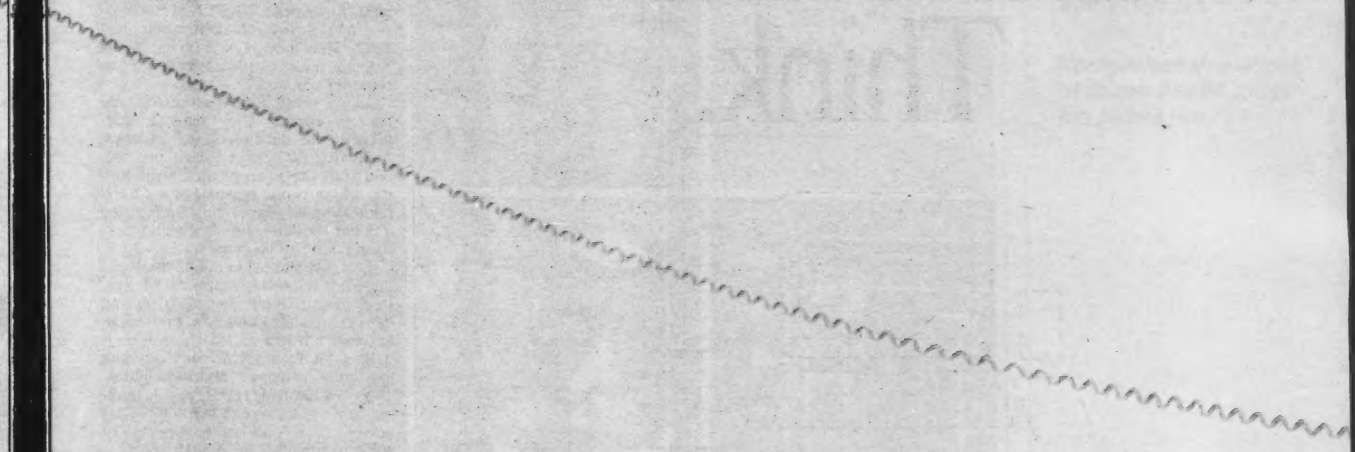
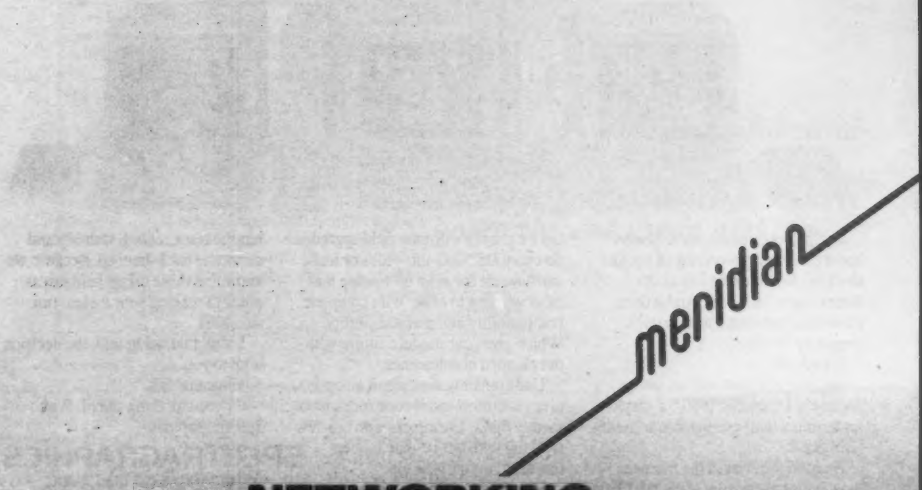




meridian

NETWORKING

Pipelines to link 1-2-3, mainframe

From page 49

operating environment as a key for data transfer, and in some cases Lotus will exploit Windows. "But we think you shouldn't have to go to Windows to move data into spreadsheets, and you shouldn't have to get an IBM PC AT," McLagan says. "Microsoft needs a very good way to bring in all sorts of data from all sorts of applications to other applications. We don't have that problem."

Instead, the problem for the largest independent software vendor is to leverage what Lotus describes as a $64 billion user investment in 1-2-3. "That's what we run up against when we introduce a new product or try to upgrade the product," he emphasizes. "The longevity of 1-2-3 has been underestimated by everyone, including Lotus."

Lotus' major highway between 1-2-3 and mainframe data will be based on the Ilink data access package. When the company acquired the product from Infocenter Software, Inc. last winter, the entry into mainframe software raised some eyebrows, McLagan admits. "But we're taking a step that I think you'll see a lot of other people take, over time — not necessarily to be in the mainframe business but rather to make resources available to PC users."

First introduced in 1984, Ilink aims to tie together micros into multiple fourth-generation language mainframe environments. Lotus currently is building bridges into other environments and drastically revising the micro software, according to McLagan. (Among other reasons, "it had a garish red screen — not Lotus' style.") Revised, renamed and given an optional general-transport mechanism, Ilink will ship commercially this year.

Additionally, Lotus will continue to sell Symphony Link, which debuted a year ago as "the backbone of our entire [IBM] 3270 environment strategy," President Jim Manzi declared at the time.

Symphony Link ties a personal computer equipped with Digital Communications Associates, Inc.'s Irma board to a mainframe running VM/CMS or MVS/TSO. "It complements Ilink — it gets you transfer, gets you scripting," McLagan says. "But we learned we had to solve a bigger part of the problem . . . and we can't be device dependent."

Nor does Lotus want to embrace specific mainframe applications too closely, after last year's codevelopment effort with Cullinet Software, Inc. fell apart. Such joint efforts between mainframe and micro software houses generally collapse because "the business is too dynamic, everyone wants too much of it, and it's not clear who's going to win in the long run," McLagan remarks.

Signal and Isys

Lotus' two financial service products — the Signal real-time market quote system and the Isys collection of historical company data — face many of the same development hurdles as Ilink and hint at how the mainframe data access tools will evolve.

Signal took an unusual twist by treating the real-time link resources as if they were a WKS file. The transfer mechanism "looked great last fall," McLagan says. "But it looks horrible now. . . . It's a long way from what we can do."

In one sense, Signal's real-time nature represents the "biggest challenge to the data pipeline," he says. Importing 200 transactions per second starts to push recalculation limits, which is one reason Lotus Chairman Mitchell Kapor has underlined quicker recalculation as a high priority for 1-2-3 development.

Isys, on the other hand, features large but relatively static data bases. It raises different issues, including data compaction and new options in storage hardware. "I think you'll hear a lot from us in compact disk read-only memory," McLagan notes. "Isys is a natural." Lotus also is looking at write-once read-many (WORM) devices. "We don't know where we're going to come out on WORM."

McLagan expects to really begin to grab customers by combining the two financial services offerings, which Lotus has promised for this summer.

"You have to replicate both the breadth and the timeliness that you had with time sharing." He also points out that financial services represents "a $700 million market — bigger than the PC spreadsheet market today. . . . We could achieve all the goals for the division without leaving that marketplace."

Division goals

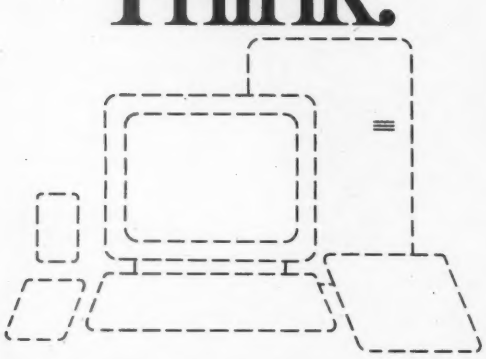
McLagan had known Kapor since the Lotus founder's days at M.I.T.'s Sloan School of Business. Last year when McLagan was in between jobs, the two bumped into each other while on vacation, and the ex-Data Resources executive ended up joining the software firm in October.

Lotus had then completed the acquisition of Dataspeed, Inc., which furnished the Signal technology. But the deals with Infocenter and Isys and the formation of the division were still in the future.

"I'm not looking for building blocks at this point; I was when I got here," McLagan says. A fourth Information Services group, started internally, aims at marketing electronic mail products by the year's end.

The division's components posted more than $5 million in sales last year, by public figures, but the work force is somewhat larger than those figures would indicate. McLagan predicts that next year the division will no longer run at a loss, but the real payoff lies further down the road. "We're a five-year bet," he sums up.

Think.



Think ahead.

At Spectragraphics, we've always had a company philosophy of not just thinking, but thinking ahead. It's something to strive for. And it does more than just sound nice in our corporate brochure.

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For example, last year we introduced the DesignSet 1080,™ a graphics terminal that's compatible with the IBM 5080.

As good as it was at the time, the most important feature of the DS 1080 was its potential. A designed-in potential for growth with easy field upgrades. So every DS 1080, this year's or last's, can have all the most up-to-date features we have to offer. With complete compatibility and maintainability. Which gives our model a future without planned obsolescence.

Unfortunately, that wasn't an option given to customers of companies who merely think. Customers who are now working with out-of-date models that aren't even a year old.

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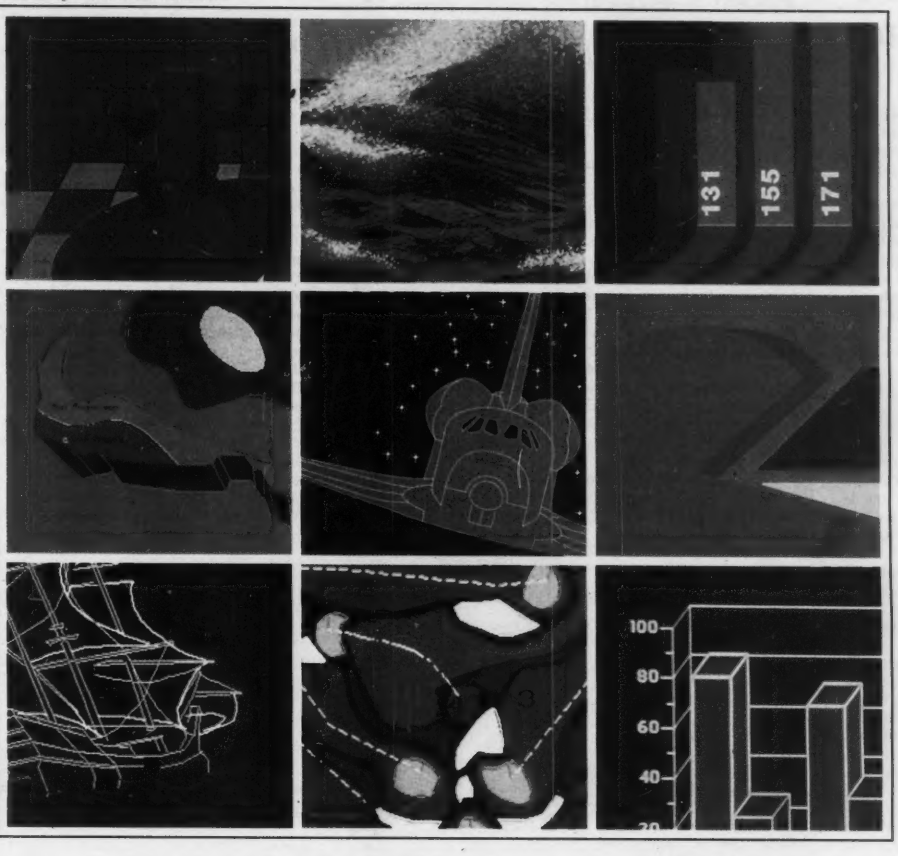
Product Spotlight

Edited by Barbara Wierzbicki



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Presentation graphics

Giving end users the power of the palette

By EDWARD F. HEITE

Long ago, in a job printing establishment far, far away, there was a shop foreman who refused to set up any page with more than three styles of type. Confronted with copy that violated the industry's rigid design canons, he would bellow, "Send it back. There's been a mistake!" Junior professional staff and apprentice printers soon learned the rules.

Presentation graphics, where professional finish is at least as important as factual content, traditionally lies in the province of professional design studios. However, thanks to recent hardware and software developments, almost any personal computer now can produce at least middling-to-good presentation graphics on 2- by 2-in. slides. The user's skill and taste remain the only variables.

In today's market, the umbrella term "graphics" covers products ranging from a Visicalc spreadsheet from Lotus Development Corp. to an Allied Linotype Co. typesetting machine. Between these extremes lurks a bewildering array of choices. But do not be lured into a game of one-upmanship, in which the graphics package touting the most number of features wins. The far more judicious approach to program selection involves taking stock of your level of graphics skill and training, the length of your deadlines and, most important, the amount of office staff time that can be spared for graphics output.

As consumer-controlled PC graphics systems mature, technological shortcomings surely will diminish, and user demands will become more sophisticated.

It is no longer sufficient to display PC graphics in color; screen colors must routinely shift to accommodate the Polaroid Corp. Palette. A graphics program today would be unacceptable if it could not print a perfectly round circle, even on a desktop printer. Yet a few years ago, any vaguely round shape that came out of a dot matrix printer was called a circle.

Personal computer graphics packages began with spreadsheet enhancements and grew to include tools for professional artists and designers. Until recently there were two kinds of graphics presentations: low-budget amateur and high-budget professional. Today there is a middle category:

Turnaround time, confidentiality and cost savings justify moving the graphics function onto the end user's desktop.

Heite teaches business information systems at the University of Delaware. He has managed both letterpress and offset printing establishments and is a practicing professional archaeologist.

Giving end users the power of the palette

Continued from previous page

low-budget user-generated computer graphics. Graphics technologies that formerly were too expensive and too complicated for everyday office workers are now relatively cheap, simple, quick and accessible.

The change can be traced to two developments: increased graphics capabilities on personal computers and simplified user interfaces that allow nonspecialists to control graphic output.

Personal computer graphics programs have become consumer products, moving out of the specialist area and into the mass market, just as word processors and relational data bases did before them.

All graphics systems share one attribute: None is able to do everything. A Microsoft Corp. MS-DOS-based personal computer is not inherently a graphics system. These machines require extensive add-ons in order to provide users with truly useful capabilities. Given the wide choices among software programs, boards, mice, plotters, monitors, printers and so on, there can never be a "standard" MS-DOS graphics hardware/software mix.

For that reason, all MS-DOS-based graphics software — as well as those programs under development — are limited by the need to accommodate a babel of existing hardware and software requirements.

Newer personal computers, designed around sophisticated graphics subsystems, offer a closer to seamless graphics user interface than do older MS-DOS systems. The Apple Computer, Inc. Macintosh, for example, provides a coherent environment in which you can easily enhance a spreadsheet with such various graphics functions as sketches, clip art or typesetting.

Currently, Macintosh graphics software such as Macpaint and Macdraw offer the neophyte the highest degree of user friendliness and flexibility available. These programs cater to more sophisticated needs as well, providing advanced capabilities such as laser printer, plotter, slide and typesetter options.

As with other systems, no single Macintosh product is likely to meet everyone's graphics needs. However, the cost of a Mac, as opposed to upgrading an existing MS-DOS system to accommodate graphics, may actually be less. A 512K-byte Mac now sells for $999. Outfitting a standard IBM Personal Computer with a color graphics board and a high-resolution monitor costs anywhere from $700 to $1,200.

A user's overriding concern is time. Outputting graphics can become vastly more time consuming than the generation of standard text or tables of numbers. If a straight spreadsheet-produced bar graph from a dot matrix printer will meet your needs, don't complicate the procedure. Adding a plotter to produce premium-quality output may stretch the time to print a single page from a few seconds to a half hour.

Microcomputer-based graphics packages range in order of difficulty and man-hours from casual to full-time. Some of the less complicated programs, appropriate for occasional office use — such as Chartmaster from Decision Resources, Inc. — may lack the slick sophistication of professional products like Mirage from Zenographics, Inc. that mimic mainframe systems in product quality and complexity. For most users, however, ease of use commands a higher priority than exotic features.

The least demanding business graphics consumers are the stereotypical managers and accountants who made Lotus 1-2-3 a market leader in graphics-generating software. These folks flash a Lotus graph on the wall and call it "business graphics." Their graphics

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Expert's Opinion

Cooperative processing lets PC users access mini and mainframe graphics

By ALAN PALLER

The continued annual 20% to 30% revenue growth in mainframe and minicomputer graphics, combined with the surge of personal computers onto desktops, has caused information processing managers to search for ways to combine the strengths of the PC with those of the minicomputer or mainframe. The goal is cooperative processing, in which each machine performs the functions for which it is best suited. These executives see the PC as one part of a continuum of platforms ranging from the PC through workstation, departmental computer and mainframe. They want each platform to work with the others, not compete against them.

Initially, the microcomputer served either as a stand-alone charting system or a graphics terminal, often emulating one of the popular Tektronix, Inc. computers. Recently, however, the PC has taken on more significant roles in the partnership. It has become a device-independent chart distributor, a chart previewing tool, a graphics editing station and even an automatic graphics program generator.

When graphics terminals cost $7,000 to $20,000, a personal computer offered a lower cost solution. Today, as the cost of graphics terminals drops and as increasing user demands for quality push up the price of graphics on PCs, the direct cost differences are not as great as they once were. It is a much larger trend that fuels the demand for graphics terminal emulation. Personal computer users are running out of capability and need to access the mainframe or mini. They are the driving force behind the growth in cooperative graphics processing.

It is these same PC users — frustrated by limited graphics software and slow, hand-fed graphics hard-copy equipment — who are pressuring vendors to expand their terminal emulation software. They are asking for an expanding array of capabilities to enhance their own productivity and to make graphics emulation compatible with the options they have purchased for their PCs.

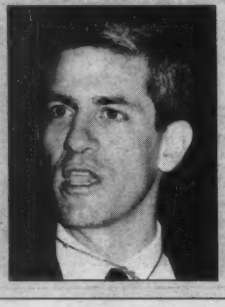
The following description of a large industrial company's attempt to provide micro-to-mainframe graphics connections provides an educational case study in how requirements continue to expand.

The user is a large manufacturing company with more than 2,000 personal computers plus IBM mainframes and Digital Equipment Corp. VAX departmental computers.

In 1983, users requested that the information systems department provide terminal emulation software that would turn their PCs into graphics terminals. The department responded with a PC package that worked with the standard IBM graphics card and over standard asynchronous (RS-232) communications lines. The PC graphics resolution was not as good as users wanted, but it was acceptable for previewing charts. Then IBM announced Enhanced Graphics Adapter capabilities for its PC, greatly improving the resolution.

By the next year, those same users had acquired plotters and other graphics printers. Now they needed more than terminal emulation; they needed a way to preview a chart on their PCs and then send that same chart to a plotter without asking the mini or mainframe to redraw the chart. Information systems responded by adding graphics device-independent support on the PC to send charts to the plotter.

The communications protocol created a problem, because complex graphics involve extensive communications. Although DEC VAX and Prime Computer, Inc. computer graphics applications ran fast enough on asynchronous communications lines, most IBM mainframes limited asynchronous communications to a sluggish 1,200 bit/sec. IBM users wanted synchronous communications. In particular, they wanted support of Digital Communications Associates, Inc.'s Irma communications cards in their PCs. Once Irma compatibility was added, productivity for IBM mainframe users increased by a factor of four or more.



"We can look forward to environments that will put all mini and mainframe graphics hardware and software at the call of every PC user.

— Alan Paller

A recent challenge came from Lotus Development Corp. 1-2-3 users who liked 1-2-3 but did not like the charts it produced. Either they were frustrated with the quality and flexibility of the graphics they were getting, or they did not want to dedicate their PC to the sole purpose of supporting a plotter. These users recognized that they already had high-speed, high-quality graphics hard-copy equipment available on their mainframe or minicomputer network. They needed to preview charts in Lotus, then pass them through the network to the higher quality equipment.

The solution was an automatic command generator that translated Lotus 1-2-3 work sheets into commands that graphics software running on the VAX and IBM computers could read and process. Users can now get high-quality charts from any plotter, graphics laser printer, thermal transfer printer, ink-jet or film recorder connected to the mainframe or minicomputer network.

The future of micro-mainframe links in computer graphics is likely to be an extension of the cooperative processing represented in the Lotus enhancement link. But new products will go much further. Some will allow charts created on the mini or mainframe to be edited on the PC and returned to the mainframe for distribution to graphics hard-copy devices or to other users. Others will offer capabilities that allow any logo or diagram produced on the PC to be integrated with charts created on the larger machines.

Among the most important of the changes will be smoother integration between programs running on cooperating machines. In the near future, we can look forward to environments that will put all the graphics hardware and software of minis and mainframes at the call of every PC user — with the touch of a button. Access will become so transparent that the user will not even know what computer is doing the work. ■

Paller is president of AUI Data Graphics/Issco, a Washington, D.C.-based firm specializing in computer graphics and visual information systems consulting and training, and a director of the National Computer Graphics Association.

In-house systems combine speed, quality output

By MICHAEL SULLIVAN-TRAINOR

Rather than pay rush charges to outside service companies for the thousands of charts and slides they need, major corporations as diverse as AT&T, Chemical Bank, LTV Aerospace, Inc. and *USA Today* use in-house systems to produce large volumes of high-quality graphics quickly.

The finance division of Chemical Bank uses Zenographics, Inc.'s PC-based Mirage and Ego graphics software programs to meet its need for quick presentation development.

"Our main cost in preparing high-quality visuals is the frequency of the changes made to text or graphics, sometimes right up to the last minute," according to Martin Schwimmer, assistant vice-president of the New York-based corporation.

The finance division runs the Zenographics' packages on an IBM Personal Computer AT with a Number Nine Computer Corp. graphics card, a Mitsubishi Electronics America, Inc. color monitor, a Kurta Corp. digitizing tablet and a Matrix Instruments, Inc. PCR high-resolution film recorder.

With the system command files, Schwimmer's department has created specified row and column alignments and commonly used geometric shapes such as three-dimensional bar graphs. "Using the command files, we have been able to align new material quickly and accurately down to the pixel level," he says.

Though operating in a very different environment, Dallas-based LTV Aerospace, a commercial and military aircraft and rocket subcontractor, also uses the Zenographics Mirage program.

The manufacturing controls department produces more than 1,000 charts a week using an IBM PC AT and data downloaded from a mainframe, according to Fred Goodman, a specialist in LTV's Industrial Modernization Division. Once the data is brought up on the PC, Mirage and Ego are used to create charts for presentations to management.

Instead of a slide production system, LTV uses General Parametrics Corp.'s Videoshow presentation device, which allows the user to present the charts on a large screen projector. The system reads the charts off a floppy disk transferred from the PC.

The Mirage package also includes a command file capability that permits certain chart formats to be built into the system. This feature enables LTV's manufacturing controls department to "build a file that allows them to use new data for the same chart format without having to recreate the charts," Goodman says.

There are approximately 35 users of graphics systems within the 15,000-employee LTV Aerospace location. All major departments use PCs with Mirage or an equivalent package and access to a Videoshow presentation system.

Meanwhile, at *USA Today*, the graphics department creates newspaper art with Microsoft Corp.'s Chart or Cricket Software, Inc.'s Cricket Graph packages on 19 Apple Computer, Inc. Macintosh computers. The graphics are used to highlight stories as well as provide instant information concerning national trends, according to Buzzy Albert, *USA Today*'s graphics editor.

"We use the charts as a way to make editorial judgments on figures. It's especially useful for editors who can't visualize well. In five minutes we can produce a chart presenting the numbers for the editor to look at," Albert says.

Both Microsoft Chart and Cricket Graph are used to transfer charts to Apple's Macdraw software for editing, and then the final work is produced on an Apple Laserwriter that is connected to the Macintoshes through an Appletalk network.

"We started with Macintoshes about two years ago with the 128K-byte machines. It was an experiment in a new electronic graphics system. Now there are Macintoshes throughout Gannett Co. newspapers from Vermont to Guam," he says.

With nationwide sales and marketing divisions, AT&T Communications also has an extensive need for graphics presentations. Its Western Region Marketing and Sales division generates some 6,000 slides a year.

"We do a large volume of slides, and almost all of them are custom made. With an outside service company, that's $20 a slide. When you're talking thousands of slides, it doesn't take long for an in-house system to pay for itself," says Bruce Decker, audio/visual manager for the division.

To fill the bill, the company acquired an Audio Visual Laboratories, Inc. (AVL) Starburst system, which runs AVL's Textgraphics, Artgraphics and Chartgraphics software. One of the advantages of the system is that graphs developed on Textgraphics can be transmitted using a modem to remote locations, allowing sales or marketing managers to make comments without traveling to Decker's San Francisco location to view the presentation. ■

Sullivan-Trainor is a Computerworld *senior writer.*

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Continued from page 58

requirements — elegant and limited — allow them to create perfectly appropriate color transparencies or report illustrations with a pen plotter.

Graphics add-ons for spreadsheets met a market demand that emerged during the first five years of the spreadsheet era. The earliest Visicalc version, then owned by Visicorp, could assemble crude bar graphs of asterisks and print them.

Visicorp then bought the marketing rights to Multisoft Corp.'s Stretchcalc, a program that added graphics commands to Visicalc. Subsequent spreadsheet releases, most notably from Lotus, have contained progressively more sophisticated graphics outputs.

Preformatted bar, line, pie, area and scatter charts are today routine features of spreadsheet packages. Some packages, such as Open Access from Software Products International, contain a slightly higher level of graphics sophistication with such options as three-dimensional bar graphs.

To go beyond a spreadsheet's capabilities, you need a spreadsheet enhancer. The Chartmaster graphics package is such an enhancement, since it illustrates tabular numerical data in standard graphics formats.

Programs like Chartmaster can take IBM's Data Interchange Format (DIF) or Microsoft's Sylk format files from a spreadsheet and represent them graphically. Inside Chartmaster, a user can edit the data and select parts of the DIF file to be displayed.

Similar capabilities, with 12 graph options, are available with Cricket Software, Inc.'s Cricket Graph, which interprets numerical files in the Sylk format or statistical data from the same manufacturer's Statworks software.

Even though real statisticians may not do pie charts, there are statistical graphics applications such as the creation of symbols and maps that go beyond what a spreadsheet or spreadsheet-based integrated package can offer.

For such applications there are symbol manipulation programs and packages with freehand drawing capabilities.

Symbol manipulators allow you to combine lettering, pictures and symbols. Some graphics program vendors have blunted the artistic challenge by providing so many packaged options that unskilled users need not innovate.

Computer Support Corp.'s Diagraph program, for example, comes with 2,200 symbols, including full screen perspective drawings and chart symbols.

The pictorial material is predrawn; the user merely manipulates and labels it. Diagraph offers no built-in method for users to create their own symbols, but the publisher offers digitizing services for a fee. If he sticks with the graphics palette that is provided with the package, a Diagraph user's mistakes should be nothing worse than an occasional pink cactus or a blue utility pole.

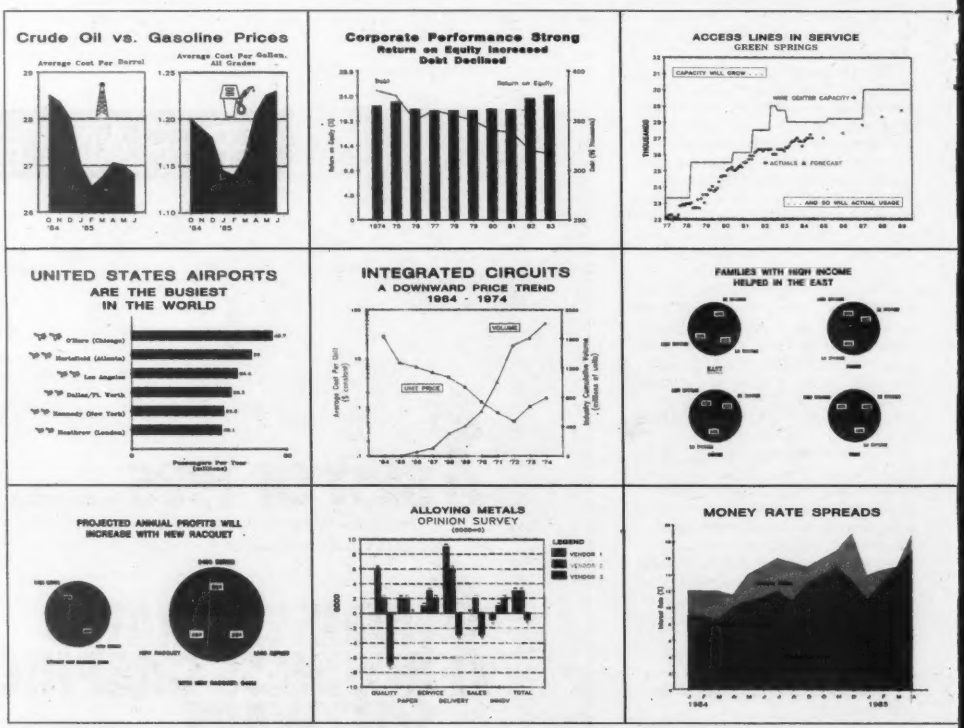
The Sound Presentations package, from Communication Dynamics, Inc., enables users to create files of clip art from geometric shapes.

Symbol manipulation packages typically contain several disks full of swipe files, much like the popular series of advertising clip art books.

Symbol libraries are bulky. The Diagraph program comes on six disks, without all the symbols. Sound Presentations is contained on 10 diskettes. The sheer bulk of files makes a hard disk an attractive option.

Both Diagraph and Sound Presentations are documented for the benefit of nontechnical end users. The Sound Presentations manual begins with a "How to set up your equipment" section that features a picture of a plotter, a printer and a personal computer. With such documentation, new users can start from any skill level.

At the third level of sophistication, users want to create their own images either from scratch or by altering images from the swipe files. Drawing and painting systems provide an electronic medium for freehand painting, drawing and



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sketching. The options are either paint or draw programs running on the Macintosh or an operating environment like Graphics Environment Manager (GEM) from Digital Research, Inc.

Paint and draw programs differ in the way they handle graphics. Paint programs store pictures as bit images, whereas draw packages store drawing instructions that can be reinterpreted by different output devices, adjusting resolution to output capabilities.

A drawn image is therefore much more useful for scaled technical graphics, while painting is preferred for stippled artwork or halftones.

Macpaint allows hand retouching of any bit-mapped screen image, pixel by pixel, with the "fat-bits" facility. A standard chart created by a spreadsheet or spreadsheet enhancer can be reworked in Macpaint.

Since Macintosh graphics are interchangeable among programs, paste-in artwork clips can be swiped and altered, creating endless opportunities for aesthetic abuse or creativity. A Macpaint user can scan or customize virtually any graphics resource and add it to the library, building a personalized repertoire of individualized artwork.

Program offerings in each of the categories — spreadsheet enhancers, symbol manipulators and drawing/painting systems — are intended to be complete production tools, each designed to work in a particular way. A package that provides spreadsheet graphing, clip art, freehand drawing and scaled drafting must therefore be more complex than a single-purpose program. The point here is that the intended user is far more important than the product.

Energraphics 2.0 from Enertronics Research, Inc. is a combined graphics MS-DOS package targeted at beginners. It can function as a spreadsheet enhancer, making standard graphs in a variety of standard formats. From its symbol library, it can import graphics elements that can be altered by the program. A user can also edit and create symbols at the pixel-by-pixel fat-bits level or with a digitizing pad or mouse.

In spite of its wide range of capabilities, Energraphics is accurately aimed at and packaged for nontechnical users. Using the separately bound, well-written and easily understandable "Beginner's Guide" and the overview booklet, novices or occasional users can begin to use the Energraphics package before ever opening the somewhat forbidding, thick, loose-leaf reference manual.

The professional or full-time user, on the other hand, might consider Zenographics' Mirage, a program that mimics on a PC the complexity and capabilities of mainframe packages. Mirage is strictly a technician's tool, with ponderous documentation and extensive capabilities. The operator's guide contains more than 600 pages of dense technical detail divided into about 15 separately numbered sections.

Another Zenographics program, Autumn, starts from the symbol manipulation point of view, allowing the user to select from over 100 different predesigned formats.

Despite advertising claims to the contrary, Autumn hardly qualifies as a package for the "computer novice, casual graphics user or manager."

More appropriately used as a subset of Mirage, this symbol manipulation program — with its 300 pages of documentation — is too advanced for beginners. Both Mirage and Autumn are solid products — if appropriately placed in the hands of seasoned graphics users.

For microcomputer graphics packages, user interfaces are at least as important as the potential output capabilities. The explosion in computer graphics has happened only since input became much easier for ordinary users. Seasoned computer jockeys may be accustomed to keyboard input and hundreds of memorized command strings, but the noncomputing public is sold on the convenience of pointing devices.

Pointing devices, notably the mouse, have become a

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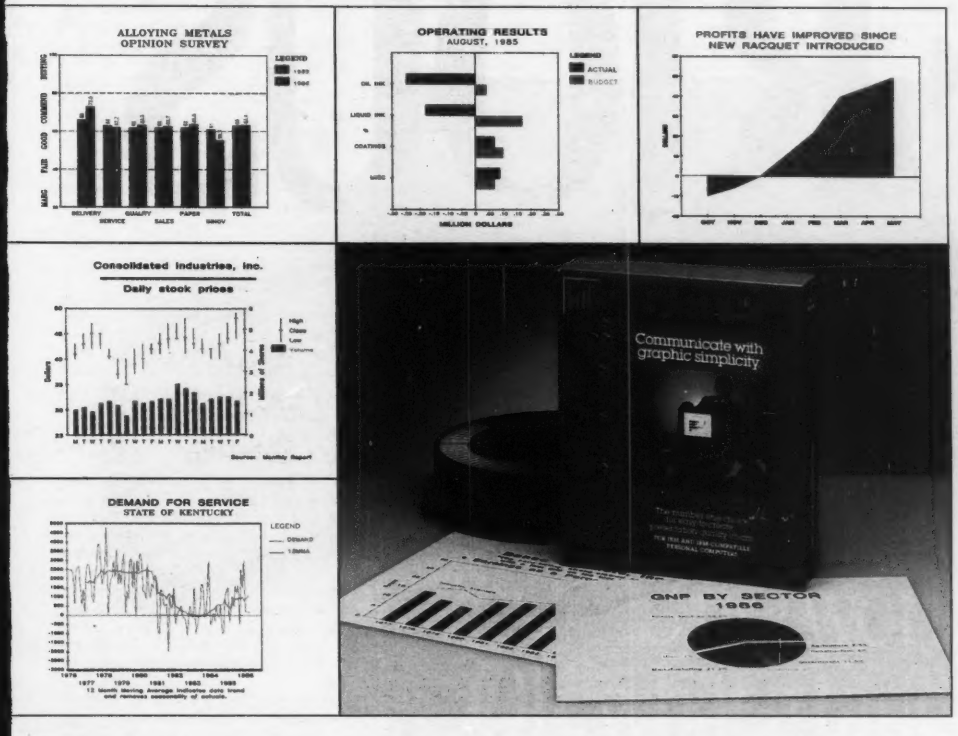

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symbol of user friendliness and creative capacity. Among the graphics software covered here, mouse input is actually necessary only in the drawing and painting packages, but it is also characteristic of the more consumer-oriented software.

Spreadsheet enhancers like Chartmaster can draw their data from DIF or Sylk files or as numerical input from the keyboard. Symbol manipulation packages require an interactive environment, but not necessarily a mouse or a pointer environment. Sound Presentations supports an optional mouse as well as graphics tablets, but all the program's features are accessible from the keyboard. Energraphics 2.0 is strictly keyboard driven.

Diagraph does not currently support the mouse or any other pointing device in its IBM versions, but a pointing interface is being developed. The older Hewlett-Packard Co. 150 version includes a touch screen.

Painting and drawing programs need some kind of pointing or drawing input device. With scanners starting at about $200 and graphics tablets starting at $300, those who need such input can get it, at least in a minimum configuration. The Macdraw and Macdraft programs let the user draw with the mouse, with dimensional control provided by built-in scaling features. GEM Draw for computers using the Digital Research GEM environment has similar features, but the mouse is optional.

Today's microcomputer can send graphics output to inexpensive but high-quality devices that only a few years ago were beyond the reach of any but the specialists who had large machines, large budgets and the luxury of time to learn arcane commands.

Since the options are multiplying constantly, the prudent buyer will check a package's list of supported hardware, which is not always prominently displayed in the documentation.

Desktop plotters and low-end laser printers have become the favored output devices for overheads and handouts, while off-screen color photography rules the roost for slides. Slide systems, such as HP and Polaroid color film recorders, have reduced both turnaround time and equipment costs.

Macintosh business output is almost by definition Apple Laserwriter output. Although Macintosh color is available through third-party products and the system can drive plotters or daisywheels, the monochrome Laserwriter remains one of the industry's best-selling printers.

Most MS-DOS graphics packages and integrated programs support plotters. Lotus 1-2-3 and Chartmaster, for instance, can be interfaced to a multiple-pen plotter to produce a multicolored overhead in about half an hour. While plotters are relatively slow output devices, their results and turnaround time are at least equal to a draftsman's best effort.

Justifications for buying a microcomputer graphics system are similar to the justifications for buying microcomputers in the first place. While PC-based graphics packages offer nothing that has not been available on larger machines, the following are good reasons for moving the graphics function onto the end user's desktop:

Turnaround time. Laser printers and plotters controlled by the originator's microcomputer can "drop everything" and do the job, which is not always the case with separate art departments and drafting rooms that have their own priorities.

> ***The explosion in computer graphics has happened only since input became much easier for ordinary users. Seasoned computer jockeys may be accustomed to keyboard input and memorized command strings, but the noncomputing public is sold on the convenience of pointing devices.***

Control. An end user seated at his own console, using his own software, does not need to delegate or explain anything to anyone.

Confidentiality. An art shop, typesetter or blueprint house is not the most secure place in the world. In-house artwork and composition systems can keep the lid on confidential moves by keeping critical information physically in-house.

Cost. Revision and proofing, one of the biggest elements in the cost of printing and artwork, is eliminated when the artist and the customer are the same person.

The recent history of personal computer graphics systems confirms Professor T. G. Lewis' fifth law of personal computing: "Knowledge costs more than software and hardware: The usefulness of personal computers increases in inverse proportion to how much people must know in order to use them." As Lewis points out, "Any consumer product that is successful must be simple." Now that computer graphics systems are becoming simple, they must inevitably become more successful. ■

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NBI was one of the first companies to recognize that isolated PCs often cause as many problems as they solve.

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PRESENTATION GRAPHICS SOFTWARE

Company	Product	Recommended Memory (in bytes)	Types of Charts: Bar	Line	Pie	Text	3-D	Scatter	Organizator	Gantt	Presentation Features: Number of Font Styles	Number of Colors	Display Multiple Charts on Screen	Edit Chart and Text on Same Screen	Symbol/Picture Library	Create 35mm Slides	File Format Support: ASCII	DIF	Lotus 1-2-3	Price
Advanced Graphics Software, Inc. Suite 105, 333 Maude Ave. Sunnyvale, Calif. 94086	*Slidewrite*	192K	No	No	No	Yes	No	No	No	No	5	7	No	Yes	No	Yes	Yes	No	No	$225
Advanced Graphics Software	*Slidewrite Plus*	256K	Yes	Yes	Yes	Yes	No	Yes	Yes	No	6	7	No	Yes	Yes	Yes	Yes	No	Yes	$345
Advanced Technology Center, Inc. Suite 238 5711 Slauson Ave. Culver City, Calif. 90230	*Plotit*	512K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	5	10	Yes	Yes	Yes	Yes	Yes	No	Yes	$550
Analytical Software, Inc. 10939 McCree Road Dallas, Texas 75238	*Boardroom Graphics*	128K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	2	4	Yes	Yes	No	Yes	Yes	Yes	Yes	$150
Autodesk, Inc. 2320 Marinship Way Sausalito, Calif. 94965	*Autocad*	512K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	4	256	Yes	Yes	No	No	Yes	No	Yes	$300
Autographix, Inc. 100 Fifth Ave. Waltham, Mass. 02154	*Autographix 35*	246K	Yes	Yes	Yes	Yes	No	No	Yes	No	5	64	Yes	Yes	Yes	Yes	No	No	Yes	$895
Autographix	*Slide Expert*	246K	Yes	Yes	Yes	Yes	No	No	Yes	No	5	64	Yes	Yes	Yes	Yes	No	No	Yes	$199
Brightbill-Roberts & Co. 120 E. Washington St. Syracuse, N.Y. 13202	*Graphix Partner*	128K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	20	16	Yes	Yes	Yes	Yes	Yes	Yes	Yes	$89
Brightbill-Roberts	*Show Partner*	128K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	20	16	Yes	Yes	Yes	Yes	Yes	Yes	Yes	$79
Business and Professional Software, Inc. 143 Binney St. Cambridge, Mass. 02142	*BPS Business Graphics*	128K	Yes	Yes	Yes	No	No	Yes	No	No	1	16	No	No	No	No	No	No	Yes	$350
Business and Professional Software	*Overhead Express*	192K	No	No	No	Yes	No	No	No	No	4	8	No	No	Yes	No	Yes	No	No	$195
Business and Professional Software	*35mm Express*	256K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	3	63	Yes	Yes	Yes	Yes	No	No	Yes	$695
Chorus Data Systems, Inc. P.O. Box 370 Continental Blvd. Merrimack, N.H. 03054	*Imigit*	512K	Yes	Yes	Yes	Yes	No	No	Yes	No	6	16	Yes	Yes	No	Yes	Yes	Yes	Yes	$295
Chorus Data Systems	*Imigit Plus*	512K	Yes	Yes	Yes	Yes	No	No	Yes	No	6	256	Yes	Yes	No	Yes	Yes	Yes	Yes	$795
Communication Dynamics, Inc. 8532 S.W. St. Helen's Drive Wilsonville, Ore. 97070	*Sound Presentations*	256K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	7	8	Yes	Yes	Yes	Yes	No	No	Yes	$300
Computer Graphics Group, Inc. 568 14th St. N.W. Atlanta, Ga. 30318	*PC Illustrator*	192K	Yes	Yes	Yes	Yes	Yes	No	Yes	No	8	8	Yes	Yes	Yes	Yes	No	No	No	$95
Computer Graphics Group	*Prograf*	192K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	10	8	Yes	Yes	Yes	Yes	Yes	Yes	No	$149
Computer Support Corp. 2215 Midway Road Carrollton, Texas 75006	*Picture Perfect*	384K	Yes	Yes	Yes	No	No	Yes	No	No	13	9	Yes	No	No	Yes	Yes	Yes	Yes	$295
Computer Support	*Diagraph*	384K	No	No	No	Yes	Yes	No	Yes	Yes	13	9	No	No	Yes	Yes	No	No	No	$395
Cricket Software, Inc. Suite 206, 3508 Market St. Philadelphia, Pa. 19104	*Cricket Graph*	512K	Yes	Yes	Yes	Yes	Yes	Yes	No		Un-limited	8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	$195
Data Business Vision, Inc. Suite B, 3510 Dunhill St. San Diego, Calif. 92121	*Graffhopper*	256K	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	2	16	Yes	Yes	No	No	Yes	Yes	No	$295
Data Business Vision	*Graphic Decision Support System*	320K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	5	16	Yes	Yes	No	Yes	Yes	Yes	No	$795
Data Business Vision	*Private Eye*	320K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	5	16	Yes	Yes	No	Yes	Yes	Yes	No	$99
Decision Resources, Inc. 25 Sylvan Road S. Westport, Conn. 06880	*Signmaster*	320K	No	No	No	Yes	No	No	No	No	8	8	Yes	Yes	Yes	Yes	No	No	No	$245

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. Further product information is available from the vendors.

CW chart compiled by Christie Sears

Product Spotlight/PC Presentation Graphics Software

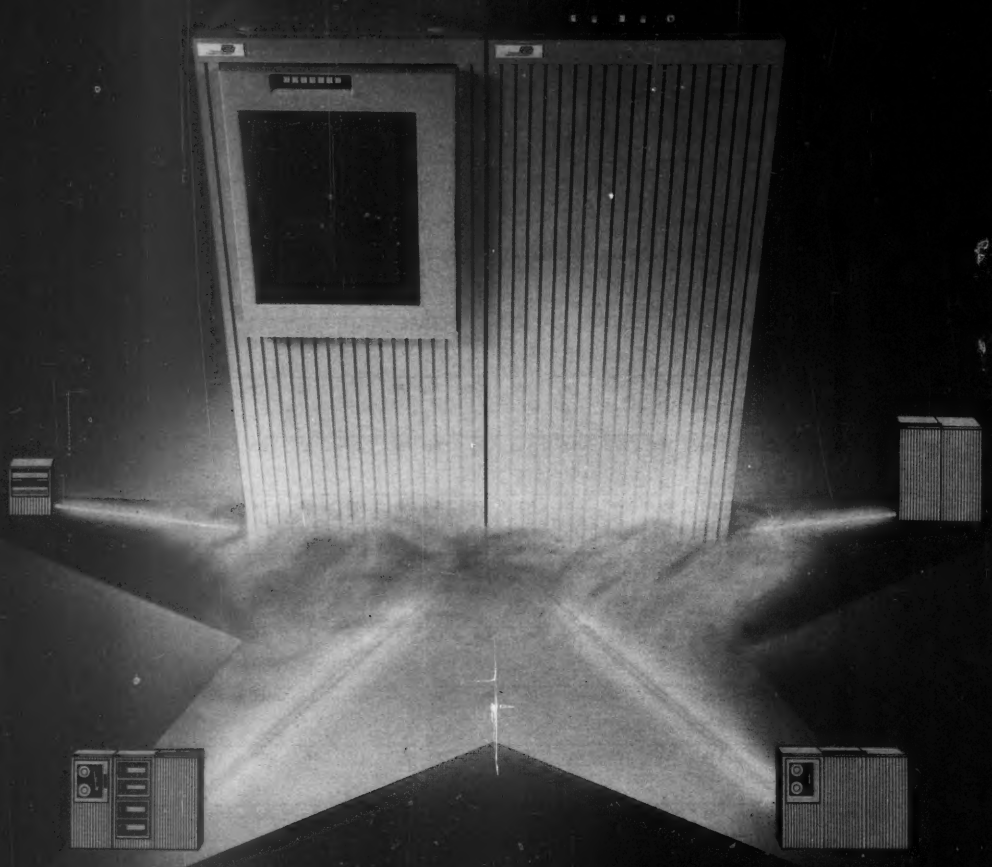
Company	Product	Recommended Memory (in bytes)	Types of Charts								Presentation Features						File Format Support			Price
			Bar	Line	Pie	Text	3-D	Scatter	Organization	Gantt	Number of Font Styles	Number of Colors	Display Multiple Charts on Screen	Edit Chart and Text on Same Screen	Symbol/Picture Library	Create 35mm Slides	ASCII	DIF	Lotus 1-2-3	
Decision Resources	*Chartmaster*	320K	Yes	Yes	Yes	Yes	No	Yes	No	No	8	8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	$375
Decision Resources	*Diagram-master*	512K	Yes	Yes	No	Yes	Yes	No	Yes	Yes	8	8	Yes	Yes	Yes	Yes	No	No	No	$345
Decision Resources	*Mapmaster*	512K	No	No	No	No	No	No	No	No	8	8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	$395
Digital Research, Inc. 60 Garden Court Monterey, Calif. 93942	*GEM Graph*	640K	Yes	Yes	Yes	Yes	Yes	No	Yes	No	2	16	Yes	Yes	No	Yes	Yes	No	Yes	$249
Digital Research	*GEM Draw*	640K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	2	16	Yes	Yes	Yes	Yes	Yes	No	Yes	$249
Digital Research	*GEM Collection*	640K	Yes	Yes	Yes	Yes	Yes	No	Yes	No	2	16	Yes	Yes	No	Yes	Yes	No	Yes	$199
Duncan-Atwell Computerized Technologies, Inc. 1200 Salem Ave. Hillside, N.J. 07205	*Lenipen/XT*	250K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Un-limited	Un-limited	Yes	Yes	Yes	Yes	Yes	Yes	Yes	$695
Electronic Cottage, Inc. 1842 Union St. San Francisco, Calif. 94123	*Image Management System Release 4.3*	512K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8	1,000	Yes	Yes	No	Yes	Yes	Yes	Yes	$995
Enertronics Research, Inc. #5 Station Plaza 1910 Pine St. St. Louis, Mo. 63103	*Energraphics 2.0*	512K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	8	16	Yes	Yes	Yes	Yes	Yes	Yes	Yes	$595
Enertronics Research	*Enercharts 2.0*	384K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	8	16	Yes	Yes	Yes	Yes	Yes	Yes	Yes	$395
EOS Corp. 8204 Brentwood Industrial Drive St. Louis, Mo. 63144	*MVP Micro Visual Productions*	256K	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	8	64	Yes	Yes	No	Yes	No	No	No	$195
Execucom Systems Corp. 3410 Far West Blvd. Austin, Texas 78731	*Impressionist*	512K	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	8	Un-limited	Yes	Yes	No	Yes	Yes	Yes	Yes	$995
Fox & Geller, Inc. 604 Market St. Elmwood Park, N.J. 07407	*Rgraph*	256K	Yes	Yes	Yes	Yes	No	No	No	No	1	4	No	Yes	No	No	Yes	No	No	$195
Fox & Geller	*Grafox*	256K	Yes	Yes	Yes	Yes	No	No	No	No	1	4	No	Yes	No	No	Yes	No	No	$99
Fox & Geller	*Ggraph 3*	256K	Yes	Yes	Yes	Yes	No	No	No	No	1	4	No	Yes	No	No	Yes	No	No	$295
General Parametrics Corp. 1505 Solano Ave. Berkeley, Calif. 94707	*Picture It Version 2*	320K	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	24	1,000	Yes	Yes	No	No	Yes	Yes	No	$700
Genigraphics Corp. P.O. Box 591 4806 W. Taft Road Liverpool, N.Y. 13088	*Graftime*	320K	Yes	Yes	Yes	Yes	No	No	Yes	No	4	16	No	Yes	No	Yes	Yes	No	No	$395
Graphic Communications, Inc. 200 Fifth Ave. Waltham, Mass. 02254	*Graphwriter*	256K	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	15	Un-limited	No	No	No	Yes	No	Yes	No	$395-$595
Graphic Communications	*Freelance*	640K	No	No	No	Yes	No	No	No	No	25	Un-limited	Yes	Yes	Yes	Yes	Yes	No	Yes	$395
Graphic Software Systems, Inc. 9590 S.W. Gemini Drive Beaverton, Ore. 97005	*GSS-Chart*	512K	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	5	Un-limited	Yes	Yes	Yes	Yes	Yes	Yes	Yes	$295
Graphware, Inc. P.O. Box 373 Middletown, Ohio 45042	*Charts Unlimited*	256K	Yes	Yes	No	Yes	No	No	Yes	Yes	1	0	Yes	Yes	Yes	No	Yes	No	Yes	$295
Golden Software P.O. Box 281 Golden, Colo. 80402	*Grapher*	256K	Yes	Yes	No	No	Yes	Yes	Yes	No	15	16	Yes	Yes	No	Yes	Yes	No	Yes	$199
Golden Software	*Golden Graphics System*	128K	Yes	Yes	Yes	Yes	Yes	No	No	No	15	0	Yes	No	No	Yes	Yes	No	No	$299
Hewlett-Packard Co. 3410 Central Expwy. Santa Clara, Calif. 95051	*The Graphics Gallery Collection*	384K	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	17	8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	$695
Hypergraphics Corp. 308 Carroll Blvd. Denton, Texas 76201	*The Business Presentation Graphics System*	256K	Yes	Yes	Yes	Yes	Yes	No	No	No	4	16	Yes	Yes	Yes	Yes	Yes	Yes	Yes	$475

Product Spotlight/PC Presentation Graphics Software

Company	Product	Recommended Memory (in bytes)	Types of Charts: Bar	Line	Pie	Text	3-D	Scatter	Organization	Gantt	Presentation Features: Number of Font Styles	Number of Colors	Display Multiple Charts on Screen	Edit Chart and Text on Same Screen	Symbol/Picture Library	Create 35mm Slides	File Format Support: ASCII	DIF	Lotus 1-2-3	Price
Imedia Corp. Suite 101 20833 Stevens Creek Blvd. Cupertino, Calif. 95014	*PC Presents*	256K	Yes	Yes	Yes	Yes	No	Yes	No	Yes	2	40	No	Yes	No	Yes	Yes	No	Yes	$495
Infographics, Inc. 17961 Cowan Ave. Irvine, Calif. 92714	*Choice*	128K	Yes	Yes	Yes	No	No	No	No	No	1	7	Yes	No	No	Yes	Yes	Yes	Yes	$395
Innovative Software, Inc. 9875 Widmer Road Lenexa, Kan. 66215	*Fast Graphs*	128K	Yes	Yes	Yes	No	No	No	No	No	0	16	No	Yes	No	No	Yes	No	No	$140
Innovative Software	*Smart Software System*	256K	Yes	Yes	Yes	Yes	Yes	Yes	No	No	6	16	No	Yes	No	Yes	Yes	No	Yes	$895
International Electronic Machinery, Inc. P.O. Box 1889 Fort Collins, Colo. 80522	*Plott 77*	512K	No	Yes	No	Yes	No	Yes	Yes	No	1	16	Yes	No	Yes	No	No	No	No	$395
Interchart Software, Inc. 104 Carnegie Center Princeton, N.J. 08540	*Chartbuster/ PC*	512K	Yes	Yes	Yes	Yes	Yes	Yes	No	No	8	16	Yes	No	Yes	Yes	Yes	No	Yes	$750
Jandel Scientific 2656 Bridgeway Sausalito, Calif. 94965	*Sigma Plot*	256K	Yes	Yes	No	Yes	No	Yes	No	No	1	16	No	No	No	No	Yes	Yes	No	$350
Jandel Scientific	*Digital Paintbrush*	256K	Yes	Yes	Yes	Yes	Yes	No	No	No	20	4	Yes	Yes	Yes	Yes	No	No	No	$395
Koala Technologies Corp. 269 Mt. Hermon Road Scotts Valley, Calif. 95066	*Executive Presentation Kit*	192K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	10	8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	$116
Martin Marietta Data Systems P.O. Box 2392 Princeton, N.J. 08540	*Showit*	128K	Yes	Yes	Yes	Yes	Yes	No	No	No	1	18	No	No	No	Yes	Yes	Yes	No	$250
Media Cybernetics, Inc. 7050 Carroll Ave. Takoma Park, Md. 20912	*Nimbus*	512K	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	18	256	Yes	No	No	Yes	Yes	Yes	Yes	$195
Metasoft Corp. 6509 W. Frye Road Chandler, Ariz. 85224	*The Benchmark Graphics*	384K	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	15	Un-limited	Yes	Yes	No	Yes	Yes	Yes	Yes	$199
Micrografx, Inc. 1820 N. Greenville Richardson, Texas 75081	*Window's Draw*	320K	No	No	Yes	Yes	No	No	Yes	No	9	16	Yes	Yes	Yes	Yes	Yes	Yes	Yes	$199
Micrografx	*PC Draw*	256K	No	No	No	Yes	No	No	Yes	No	3	6	Yes	Yes	Yes	Yes	Yes	No	No	$395
Micrografx	*In-A-Vision*	320K	No	No	Yes	Yes	No	No	Yes	No	9	16	Yes	Yes	Yes	Yes	Yes	Yes	No	$495
Micropro International Corp. 33 San Pablo Ave. San Rafael, Calif. 94903	*Chartstar*	192K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9	8	Yes	No	No	No	Yes	Yes	Yes	$295
Microsoft Corp. P.O. Box 97017 16011 Northeast 36 Way Redmond, Wash. 98073	*Microsoft Chart 2.0*	256K	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	6	16	Yes	Yes	No	Yes	Yes	Yes	Yes	$295
Omicron Software Suite 590 57 Executive Park Atlanta, Ga. 30329	*Plotrax*	256K	Yes	Yes	Yes	No	Yes	Yes	No	No	1	1	No	Yes	No	No	Yes	Yes	Yes	$340
Pal Software Corp. Suite 103 1560 N. La Brea Ave. Los Angeles, Calif. 90028	*Hotpak Presentation System, 2.10*	256K	Yes	Yes	Yes	Yes	No	No	Yes	Yes	39	4	Yes	Yes	Yes	Yes	Yes	No	Yes	$350
Paperback Software International 2830 9th St. Berkeley, Calif. 94710	*Draw-It*	256K	Yes	Yes	Yes	Yes	No	Yes	No	No	2	17	No	Yes	Yes	No	Yes	No	No	$29.95
PC Software #416 9120 Gramercy Drive San Diego, Calif. 92123	*Executive Picture Show*	256K	Yes	Yes	Yes	Yes	Yes	No	Yes	No	13	4	Yes	Yes	Yes	Yes	No	No	Yes	$245
Peachtree Software, Inc. 4355 International Blvd. Norcross, Ga. 30093	*Business Graphics System*	128K	Yes	Yes	Yes	Yes	Yes	Yes	No	No	7	8	Yes	Yes	No	No	Yes	No	No	$49

Product Spotlight/PC Presentation Graphics Software

			Types of Charts								Presentation Features						File Format Support			
Company	Product	Recommended Memory (in bytes)	Bar	Line	Pie	Text	3-D	Scatter	Organizator	Gantt	Number of Font Styles	Number of Colors	Display Multiple Charts on Screen	Edit Chart and Text on Same Screen	Symbol/Picture Library	Create 35mm Slides	ASCII	DIF	Lotus 1-2-3	Price
Pyxel Applications 2917 Mohawk Drive Richmond, Va. 23235	*Pyxel Visuals*	192K	No	No	No	Yes	No	No	No	No	2	14	No	Yes	No	Yes	Yes	No	No	$98
Redding Group, Inc. 109 Danbury Road Ridgefield, Conn. 06877	*Graftalk 4.0*	256K	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	5	16	Yes	Yes	No	Yes	Yes	No	Yes	$695-$795
Samna Corp. 2700 N.E. Expwy. Atlanta, Ga. 30345	*Samna Decision Graphics*	256K	Yes	Yes	Yes	Yes	Yes	Yes	No	No	5	16	Yes	Yes	Yes	Yes	Yes	Yes	Yes	$450
SMI Enterprises Corp. P.O. Box 582221 Tulsa, Okla. 74158	*Lighthouse*	256K	Yes	Yes	Yes	No	Yes	No	No	No	1	3	No	No	No	Yes	Yes	Yes	No	$495
Softel, Inc. 25 Maple Lane East Hampton, N.Y. 11937	*Videogram*	640K	No	No	No	Yes	No	No	No	No	43	64	Yes	Yes	Yes	Yes	No	No	No	$75
Software Publishing Corp. P.O. Box 7210 1901 Landings Drive Mountain View, Calif. 94039	*Harvard Presentation Graphics*	384K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	5	16	Yes	Yes	No	Yes	Yes	No	Yes	$395
Spectrum Holobyte, Inc. Suite 325, 1050 Walnut Boulder, Colo. 80302	*The Executive Picture Show Version 3*	256K	Yes	Yes	Yes	Yes	Yes	No	Yes	No	12	3	Yes	Yes	Yes	Yes	No	No	No	$245
Stella Systems, Inc. 10430 S. DeAnza Blvd. Cupertino, Calif. 95014	*Syon*	256K	Yes	Yes	Yes	No	No	No	No	No	2	8	No	Yes	Yes	Yes	Yes	Yes	Yes	$199
STSC, Inc. 2115 E. Jefferson St. Rockville, Md. 20852	*Statgraphics*	640K	Yes	Yes	Yes	Yes	Yes	Yes	No	No	1	16	No	Yes	Yes	Yes	Yes	Yes	Yes	$795
Venture Software 16200 Ventura Blvd. Encino, Calif. 91436	*Bottomline Graf*	256K	Yes	Yes	Yes	Yes	No	No	No	No	1	7	No	No	No	No	Yes	No	No	$99
Visible Systems Corp. 336 Baker Ave. Concord, Mass. 01742	*Visible Analyst*	384K	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	7	12	No	Yes	Yes	No	Yes	No	Yes	$595
Visual Communications Network, Inc. 238 Main St. Cambridge, Mass. 02142	*Executivision*	256K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	11	16	Yes	Yes	Optional	Yes	No	Optional	No	$395
Visual Communications Network	*VCN Concorde*	640K	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	15	64	Yes	Yes	Yes	Yes	No	Yes	Yes	$695
Zenographics, Inc. Suite 250 19752 MacArthur Blvd., Irvine, Calif. 92715	*Mirage*	512K	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	60	Unlimited	Yes	Yes	Yes	Yes	Yes	Yes	No	$895
Zenographics	*Autumn*	512K	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	60	Unlimited	Yes	Yes	Yes	Yes	No	No	No	$595
Z-Soft Corp. Suite A-495 1950 Spectrum Circle Marietta, Ga. 30067	*PC Paintbrush Designer series*	320K	No	No	No	Yes	No	No	No	No	75	64	Yes	Yes	No	Yes	No	No	Yes	$235



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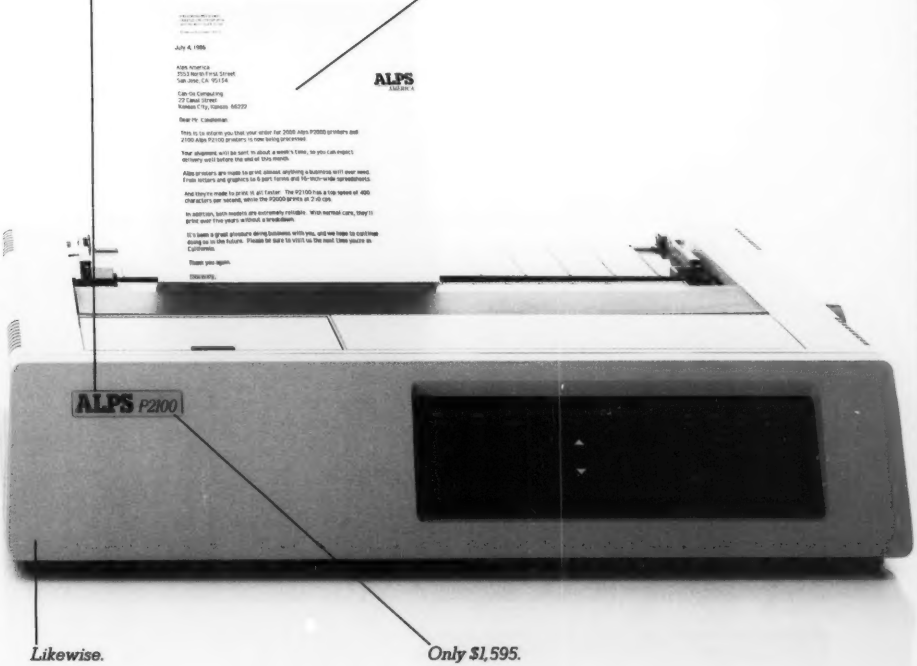

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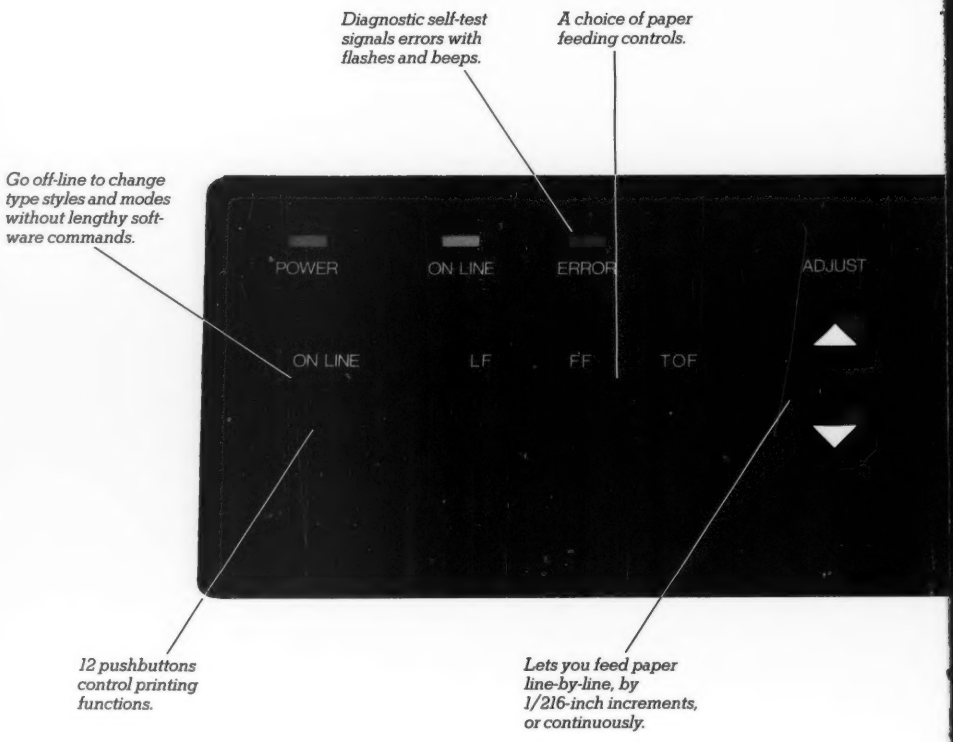

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HED PANEL.

Clears print buffer of data without printing it.

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Automatically reprints data stored in print buffer.

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Boy, is it fast. 400 cps in draft mode.

data stored in the print buffer.

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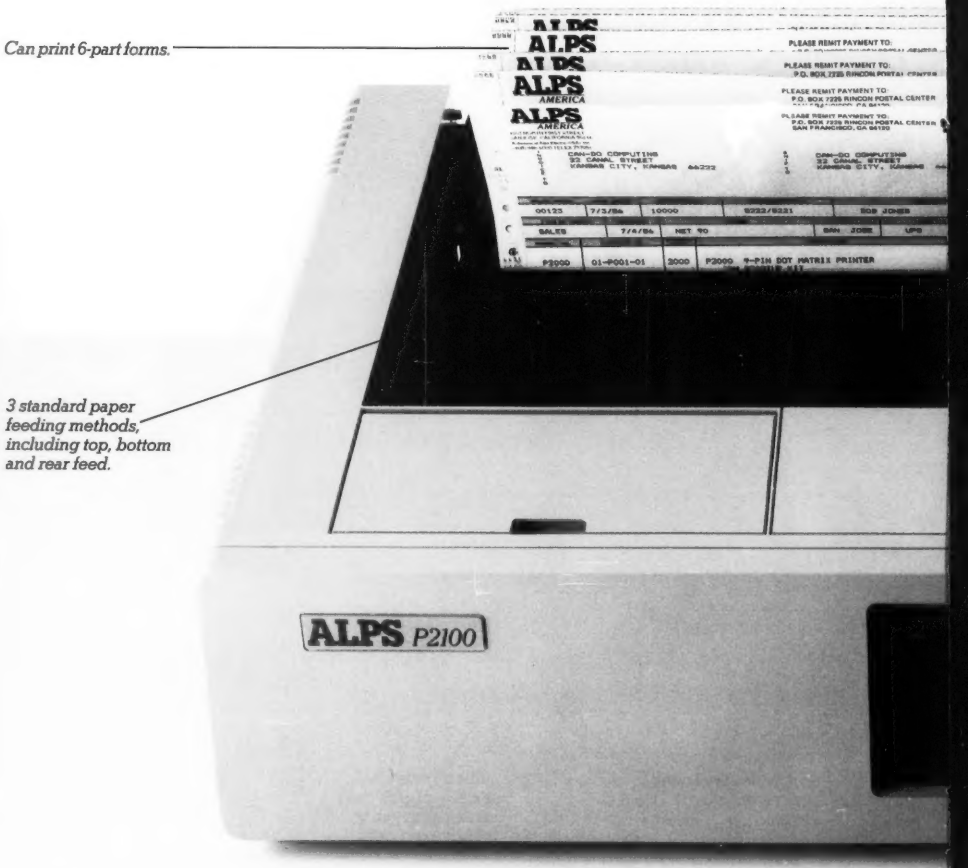

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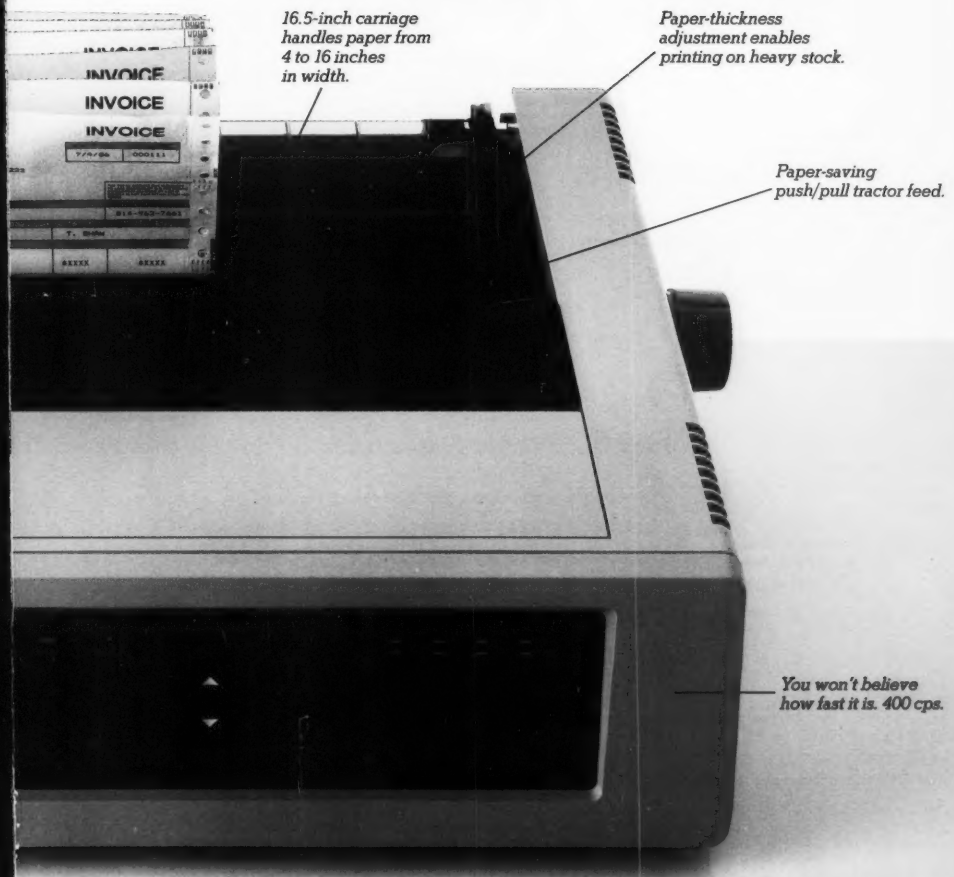

everything, they handle it more efficiently.

Both come with a built-in two-way tractor feed (push and pull) that saves paper other printers would normally waste. Plus a choice of three different paper feeding methods, all standard.

All in all, you'd be hard pressed to find printers with a greater appetite for work.

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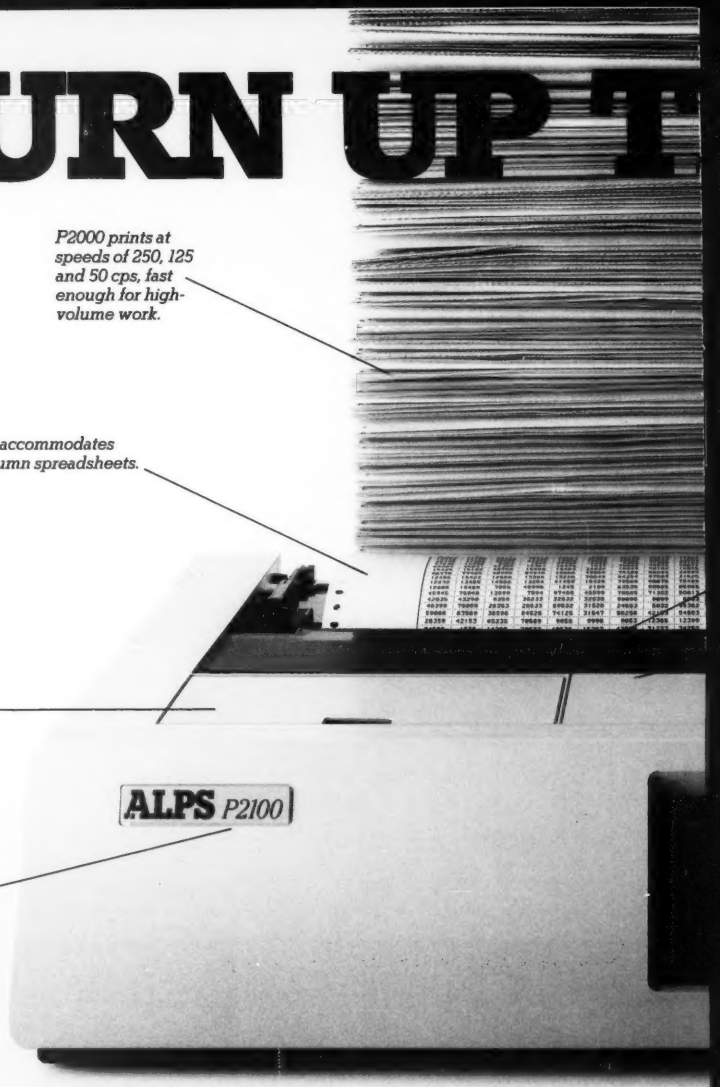

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Each offers a choice of three speeds. All fast.

The P2100 prints drafts at 400 cps, memos at 200 cps and letter-quality documents at 80 cps, while the P2000 prints at 250, 125 and 50 cps in its three modes.

HE VOLUME.

So either printer can easily take on all the work an office full of PCs can dish out.

And they'll take care of it faster, thanks to time-saving features like a built-in tractor feed, expandable print buffer and multiple type font cartridges.

In fact, for heavy volume work, Alps printers stack up favorably against much more expensive machines.

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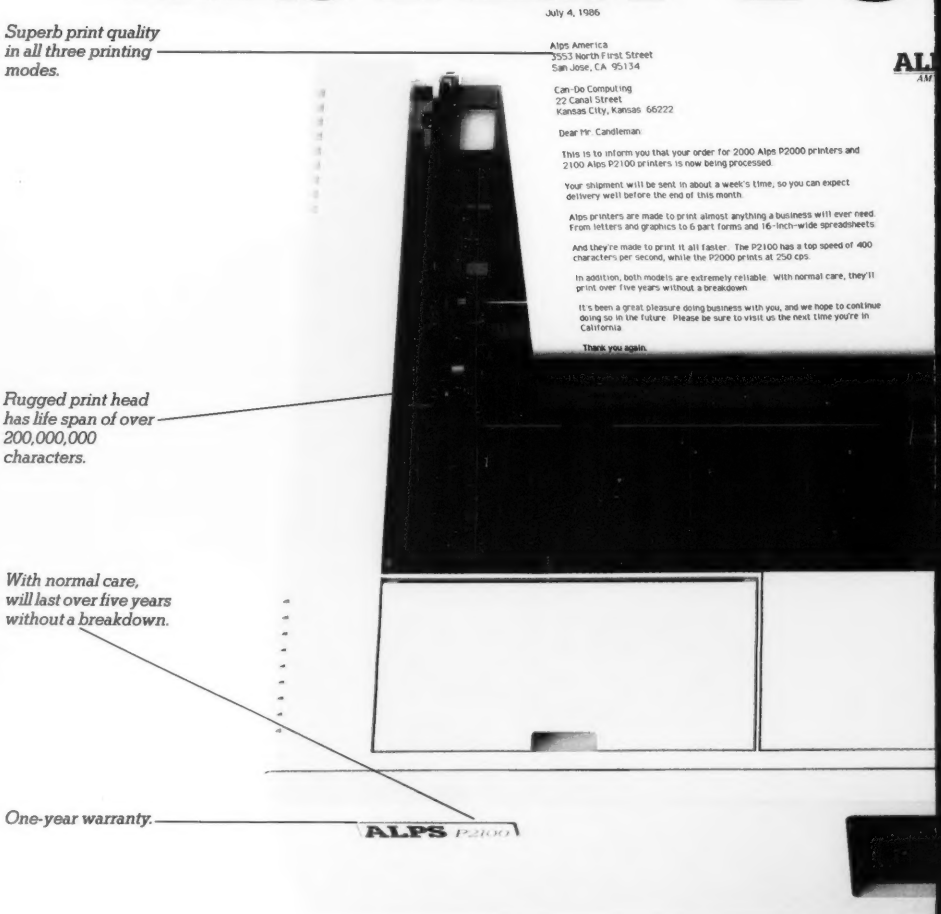

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But Alps printers aren't just built to run quietly. They're built to run a long, long time.

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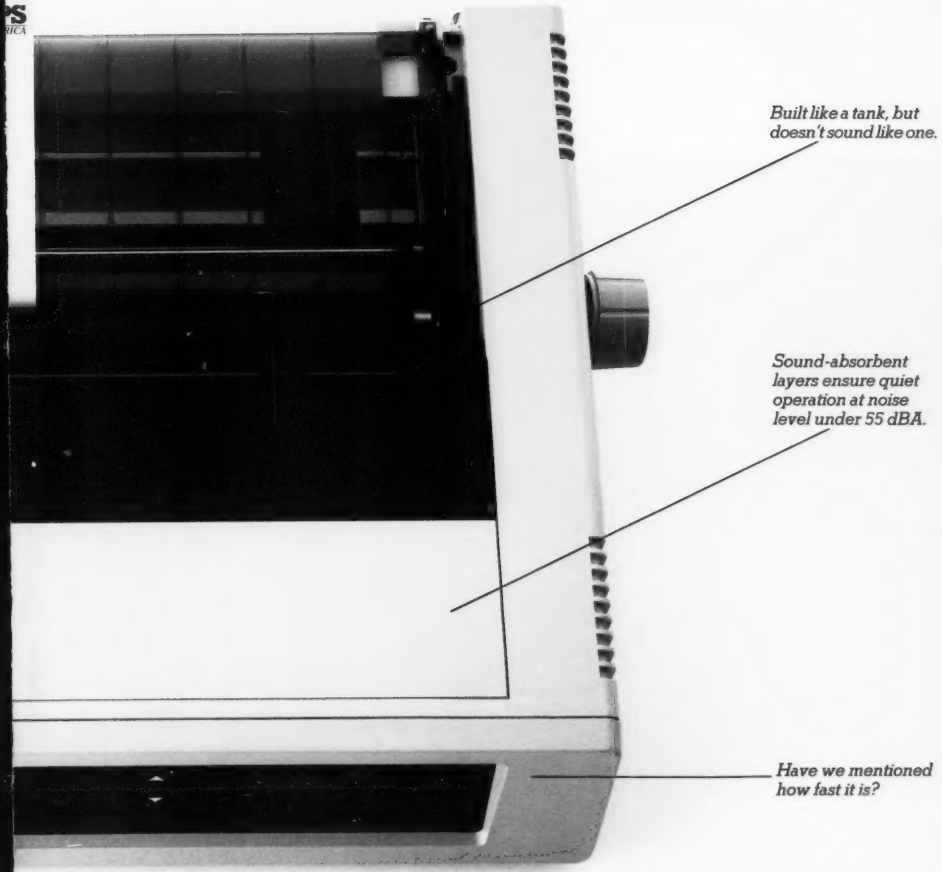

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In Depth

Image processing offers MIS a new view of information

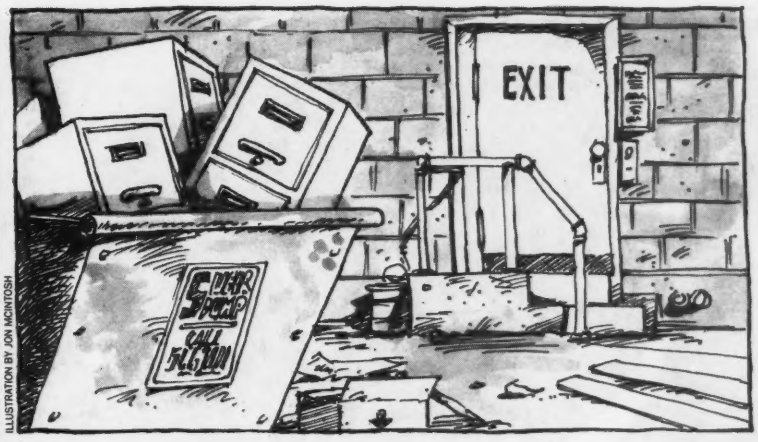


ILLUSTRATION BY JON MCINTOSH

Digital image processing will change the way information is stored, accessed, transmitted and analyzed. Yet few in MIS are aware of the potential effects — reduced costs, improved information control and easier access — on the organization.

By CONNIE MOORE

MIS directors rarely view the elimination of paper as exciting work or even as a task within DP's domain. Office automation specialists, trying for years to achieve a "paperless office," have succeeded only in creating a "less paper" office.

The burden of storing and retrieving vital business records traditionally has fallen on the records management department. This department has been trying for years to cope with manual filing systems, hordes of filing clerks and cumbersome micrographics equipment.

Digital image processing has the potential to change this otherwise bleak picture. Through digital image processing, paper documents can be scanned line by line, converted to digital bit streams, stored on optical disks and displayed on high-resolution computer terminals. Once converted to digital format, document images can be transmitted over communications networks and accessed by several users at the same time.

This technology represents the first opportunity to literally destroy original documents and replace them with computerized images.

Digital image processing technology is not simple. Digital image systems frequently use optical disks, data base management systems, artificial intelligence, local-area networks and advanced optical character recognition (OCR) techniques. Often these systems must achieve throughput rates that equal or surpass large transaction systems. In addition, a large image system can cost several million dollars for hardware alone; the software development and integration costs may be even greater.

The role of MIS

Despite the complexity of digital image systems and the overwhelming interest in this technology by several organizations in both public and private sectors, few MIS professionals are aware of digital image processing and its potential impact. Instead, the technology has caught the attention of the records management and end-user departments. Because these departments process paper on a daily basis, they are more aware of the paper problems within organizations than either DP or office automation specialists.

Because MIS is relatively uninvolved in digital image processing, some organizations unknowingly allow costly and sophisticated image systems to be designed and installed with

Moore is a manager in the Management Information Consulting Division of Arthur Andersen & Co. in Washington, D.C.

minimal input from the MIS department. All too frequently, the unsophisticated buyer relies upon hardware vendors to complete the functional and technical design of the system.

In other instances, the records management department or end users design the system without a good understanding of image indexing requirements, functional requirements, audit trails, networking and throughput requirements, integration with data processing systems, performance and other complex design issues.

Data processing professionals need to understand what digital image technology is and the importance of incorporating this technology into DP's domain.

Image processing may be the next major type of information handling that will fundamentally change the way information is stored, accessed, transmitted and analyzed. The MIS department must become involved in this new technology as organizations move away from paper-based information to digital image systems.

> ***Image processing may be the next major type of information handling that will fundamentally change the way information is stored, accessed, transmitted and analyzed.***

Why digital image processing?

Digital image processing is well suited for organizations — such as insurance companies, banks, financial institutions, transportation and shipping companies, manufacturers, engineering companies and government agencies — that deal with large document-handling problems. Several of the more pioneering organizations that are aggressive in the use of leading-edge technologies for productivity enhancement have become extremely interested in digital image systems during the past two to three years.

Through its involvement in wholesale equipment procurements and major installations, the U.S. government has been largely responsible for the initial interest and growth of image systems. Some of the earliest federal installations include the Library of Congress, the U.S. Patent & Trademark Office, the U.S. Army and Air Force and the Internal Revenue Service. The government-sponsored image systems users group, Digital Image Applications Group (DIAG), has grown to more than 400 members in the past two years. Several other state and federal agencies are currently designing and procuring digital image systems.

Because companies are concerned about divulging too much information to competitors with similar business problems, details on image processing installations in private industry are less available. However, interest in the technology remains quite strong, especially for paper-intensive insurance, banking and engineering operations. Some well-known commercial user organizations include Security Pacific National Bank, United Services Automobile Association and General Electric Co.

Problems and solutions

DP and office automation systems have not eliminated the "paper factories," because nearly two-thirds of the paperwork used in businesses is available only in nondigital format.

These paper documents cannot be input into computer systems for a number of reasons. First, drawings, signatures and pictures cannot be typed into the computer. In addition, manual data entry would be far too time-consuming and prohibitively expensive. The on-line computer storage costs would be astronomical. Finally, certain documents must be retained in image format for legal purposes.

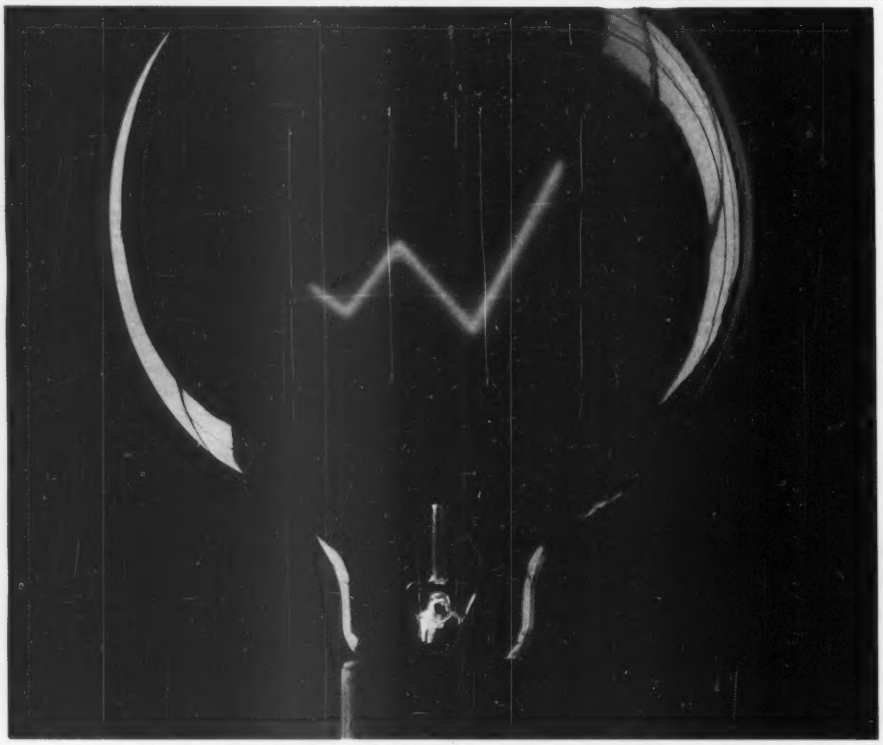
In the past, paper filing systems could be replaced only by cumbersome and labor-intensive micrographics systems. Digital image systems offer an alternative to traditional micrographics.

Digital image processing eliminates the need for organizations to use hard copies of paper documents. Instead of paper files, image processing systems create digital images of documents that can be stored and retrieved electronically. Some of the benefits include the ability to do the following:

- Reduce costs.
- Safeguard information: improved document control, elimination of lost documents.
- Reduce storage space.
- Reduce clerical personnel requirements.
- Provide electronic access to documents for remote users.
- Allow users to access the same documents simultaneously.
- Increase competitive edge: increased speed for document retrieval.

Reduce costs. According to the Association of Information System Professionals, only 5% of the filing costs in an office goes to equipment, while 70% goes to salaries, 20% to space and 5% to supplies. By increasing the investment in alternative information systems and equipment, the cost of office space and salaries can be drastically reduced.

The most tangible and impressive benefit of image processing, which is one of these alternative



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technologies, can be substantially lowered costs. The cost for large paper-based filing and retrieval operations may approximate as much as 35% of an average company's base operating cost.

For example, a major financial institution's image requirements study revealed that an image system would pay for itself within three to four years. The results show a savings in the range of several million dollars during the first five years. Dollar savings are based on a reduction in clerical personnel and in the space devoted to records storage.

Some of the most dramatic cost savings are associated with the storage of engineering drawings. The saving of storage space alone can justify an image system purchase. Most engineering drawings (34 in. by 44 in.) are much larger than office documents, and each copy of the engineering drawing must be retained for a number of years. The time-consuming and error-prone methods currently used to file and retrieve large volumes of engineering documents have resulted in systems that are costly and inefficient to maintain.

Most engineering departments realize a two-year payback for image processing. Typically, manual engineering drawing systems require 20 clerical hours per week for filing and retrieving paper drawings. Digital image processing can significantly reduce the time spent filing and retrieving these documents.

Safeguard information. Too often, businesses are in a position in which valuable information has been retained, but the paper file cannot be located. Image processing reduces the risk of misfiling paper, because employees no longer handle the physical documents after the input process.

Digitized documents cannot be readily destroyed, lost or altered, because they are stored on nonerasable media. As a result, signatures, stamps and other legal imprints are protected. Using proper disaster recovery procedures, digital images can be guarded from fires, floods and other disasters, while it is almost impossible to safeguard the masses of paper documents stored in warehouses.

Reduce storage space. The amount of office space that can be saved through image processing is substantial. A single 12-in. optical disk can easily store 20,000 paper document images on each side of the disk. A storage device holding 100 optical disks can store the equivalent of 400 filing cabinets, 250,000 engineering drawings, 80 million pages of text or 15 million bit-mapped screens of computer-aided design and manufacturing (CAD/CAM) or graphics data.

The cost of storage space alone can be a major reason for installing a document image system. For example, the federal government estimates that if all of its documents were filed in filing cabinets placed side by side, the line of cabinets would extend more than 1,000 miles.

Frank Moore, project manager of the IRS' Files Archival Image Storage and Retrieval System Optical Image Project, estimates that the National Archives is currently holding 1½ billion income tax returns — taking up 3½ million cubic feet of space — that must be retained for seven to 7½ years, depending on the type of return. Also, the IRS itself is storing an additional 1½ million cubic feet of returns. According to Moore, the IRS spends an estimated $13 million a year for storage and retrieval of documents housed at the archives and, additionally, spends $20 million a year on its own storage, control and transportation.

In the private sector, one large manufacturer plans to acquire an image processing system in order to avoid constructing another office building to store paper.

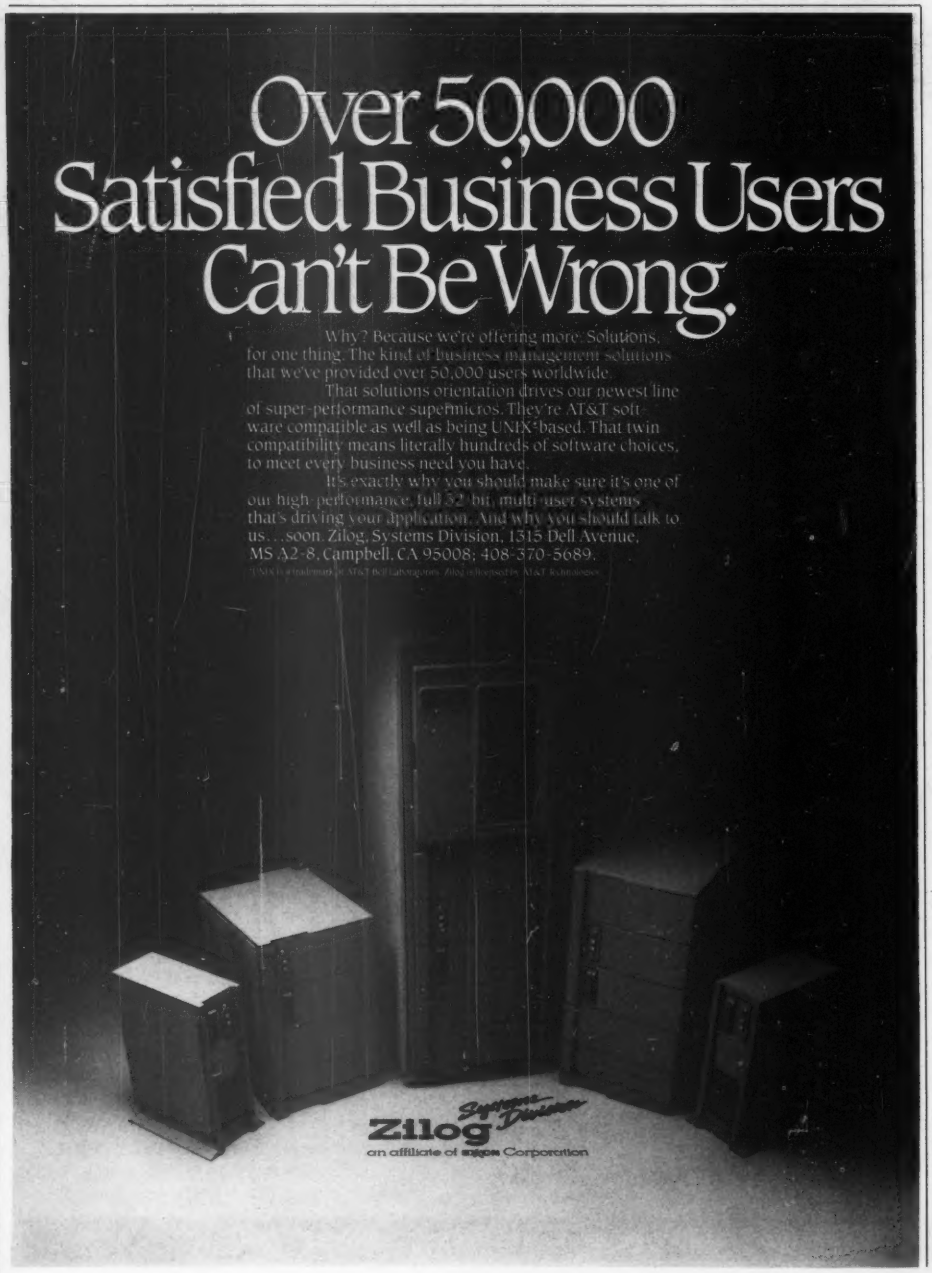
Reduce clerical personnel. By the 1990s, there will be fewer workers available to fill clerical positions. At the same time, the shrinking work force will command higher salaries. According to a recent study by a leading OA vendor, there will be 40% fewer entry-level workers in the 1990s and fewer office workers available to handle paper documents.

The limited availability of clerical workers may force businesses in the future to rely upon technology to fill clerical positions. For example, one company is experiencing difficulty in hiring file clerks to work in certain geographical areas, because it is unable to meet regional wage demands. This company is experimenting with image technology as an alternative means of filing and retrieving information.

Provide electronic access to documents for remote users. A future goal of image processing is to provide remote users with high-quality, high-resolution access to document images. Current means of image delivery include mail services, overnight delivery services and transmission by facsimile machine.

Image transmission through wide-area networks is difficult because networks currently available are not designed to move the large amount of data required to produce images. Once transmission obstacles are overcome, electronic image access will allow rapid delivery of handwritten signatures and information, graphics presentations as well as other documents.

Provide accessibility of documents. Frequently, companies find the sheer logistics of moving paper throughout the organization difficult. Problems arise when several workers need to access a paper file at the same time. The problem is solved either by duplicating files or by having workers wait until the original file is returned to storage. Other inefficiencies arise when employees in multiple sites need access to paper files. For example,



System components: Scanners, lasers build an image

The primary components used in a typical digital image system include document scanning devices, image system controllers and processors, optical disk storage devices, printers, high-resolution workstations and system software. Although many peripherals are available from OEMs, a vendor or hardware systems integrator is needed to assemble all of the components into a functional image system.

Scanners. Scanners are the primary input devices for an image system. Image scanners are quite different from optical character recognition (OCR) readers, because scanned documents are not converted to alphanumeric text. Instead, during the scanning process each line on the document page is divided into thousands of picture elements, or pixels.

When a document is scanned, each pixel is interpreted as either a black or white point on the page. The scanned image becomes a bit stream of 1s and 0s that represent black or white dots on the page. After the entire document is scanned, the pixels can be electronically reassembled to reproduce an exact copy of the paper document.

Typically, scanning densities are measured by the number of pixels per inch on the horizontal and vertical axes. Most organizations require 200 by 200 pixel/in., although engineering departments usually require a much higher scanning density for blueprints and drawings.

Scanners are available in many different varieties. Expensive, high-speed scanners can process up to one page per second, whereas slower desktop scanners may only scan 10 to 12 pages per minute. Scanners can be combined with bar code readers and OCR devices so that the scanning process captures both raster and alphanumeric information as the pages are scanned.

Scanning color images is technically feasible but may be prohibitively expensive. For most normal business applications, black-and-white scanning is sufficient.

Image controllers. Although vendors configure image components differently, in most configurations the scanners, terminals and storage devices are linked to a hardware device known as an image controller. Depending on vendor and configuration, the image controller may range from a microprocessor to a minicomputer.

Typically, this device provides image enhancement, compression and decompression of scanned images, conversion from analog signals to digital bit streams and the physical routing of images throughout the system.

Optical disks and other storage. Of all the peripheral devices used on an image system, the optical disk has captured the greatest amount of user attention. Optical disks are a new storage media that use lasers to read and write information onto the surface of the disk.

One of the primary advantages of optical disks is the write-once nature of the media in today's market. Once information is written onto write-once disks, the data cannot be erased. Although the write-once characteristic limits data storage, the feature protects images that serve as original documents. Erasable optical disks should be commercially available in the next three to five years, but they have limited use for image processing in most environments.

Another advantage of the optical disk is the vast amount of data that can be stored on a small surface. For example, a 12-in. optical disk can store 1G byte of data on each of its sides. By using the storage capability available with optical disks, it is possible to store 40,000 images on one 12-in. disk.

> ***Whatever the configuration, a digital image system must have the ability to process large numbers of documents rapidly, enhance document images to an acceptable level, store these documents at a low cost, allow retrieval times of a few seconds and provide accessibility to multiple users.***

Large storage capacity is essential for digital image systems, because scanned documents require significantly more direct-access storage than typed documents. For example, an 8½- by 11-in. page scanned at 200 pixel/in. requires 50K bytes of storage on a computer disk after compression. When compared with the 2.5K bytes of storage required for a typed page created through word processing, it is easy to understand why optical disks are needed to store scanned images.

A few image system vendors have opted to store digital images on microforms rather than on optical disks. In these configurations, the images are raster scanned from microfiche or microfilm, digitized and converted to digital bit streams. The digital image can be transmitted and displayed in the same manner as an image that has been stored on optical disk.

The user is unable to distinguish the difference between images stored on digitized microforms and those on optical disk. For some vendors, particularly Eastman Kodak Co. and Canon U.S.A., Inc., digitized micrographics provides a technological bridge from traditional micrographics systems to optical disk systems.

Jukeboxes. For an image system to be successful, a certain number of active documents must be accessible on-line. Typically, the on-line documents are stored on optical disks located in a device known as a "jukebox." The name of the unit is derived from the old-fashioned record jukeboxes, and the general principle is similar.

The jukebox is an electromechanical device that uses a variety of mechanisms to move an optical disk quickly from storage onto a disk drive. A single unit can hold from 20 to 200 optical disks and multiple disk drives.

Currently, most digital image systems use jukeboxes for on-line storage. Some experts in the technology forecast that jukeboxes will ultimately become unnecessary when optical disk drives are less expensive and when drives can handle stacked platters.

Workstations. One of the more expensive components of an image system is the image display terminal. Workstations are costly, because the terminals are often intelligent high-resolution devices that display from 200 to 400 pixel/in. and zoom, pan, rotate and window the image.

Sometimes the image terminals can be linked to the mainframe through an IBM 3270 coaxial connection in addition to being linked to the image system. However, many user organizations are still reluctant to buy expensive image terminals, particularly if users already have a 3270 terminal or a desktop micro. A few OEM suppliers are developing an image display capability for PCs that should eventually lower the per-workstation cost and address the problem of needing two workstations on a single desktop.

Output devices. Output devices are usually modified laser printers that cover the range from desktop to high-speed printers. Other devices may include computer output to microfiche for micrographics applications — which is appropriate for inactive, long-term archival records or in installations that have not completely converted to digital storage.

Software options

Software consists of both system software and applications software. The software concept supports image capture, processing, electronic storage, routing and retrieval, communications and printing.

System software includes image enhancement, compression/decompression, physical routing of images, network protocols and access methods.

Application software can include image work flow software; management statistics; audit trail software; electronic mail and text overlay on images plus key-word search for ASCII text; windowing to images, text and data; or screen design utilities.

Whatever the configuration, a digital image system must have the ability to process large numbers of documents rapidly, enhance document images to an acceptable level, store these documents at a low cost, allow retrieval times of a few seconds and provide accessibility to multiple end users.

— CONNIE MOORE

engineering companies often must duplicate drawings in order to allow engineers in different locations access to the same drawings.

Digital image processing allows users in an organization simultaneous read access to an image. Digital images stored on a central system can eliminate the need for duplicate files in multiple locations throughout a building.

The automatic routing of images is another major benefit associated with digital image processing. Work flow software, which establishes an electronic path for the movement of documents through an organization, can replace the physical movement of paper by routing document images between workers in different work groups or departments without end-user intervention.

Increase competitive edge. Service companies attract and retain customers by providing fast processing and quality service at a lower cost.

A digital image system can increase productivity significantly, lower costs and shorten the amount of time that customers have to wait for service.

By implementing digital image systems, several banks and insurance companies claim to have considerably increased their competitive advantage over companies that are still using paper-based systems.

In one financial services company, the trust department was able to handle more customer inquiries about individual retirement accounts (IRA) and process a greater number of IRA applications before the income tax filing deadline by gaining more immediate access to information. This company claims to have increased productivity by 100% and to have gained a competitive advantage over other financial institutions selling IRAs.

In another case, the international division of a bank was able to show a significant cost saving by reducing the float — the interim period in a money transfer transaction — associated with sending international banking documents to correspondent banks throughout the world.

In these instances, the financial organizations not only increased productivity and lowered costs but also gained a significant advantage over competitors through the application of technology.

A typical installation

A typical user organization can process hundreds or thousands of documents a day using a digital image system (see story above). These documents, of various shapes and sizes, consist of handwritten forms, typed documents, printed materials or a combination of formats.

To input a document into the system, the paper is scanned and the document stored temporarily on a magnetic disk buffer. At this time, a worker views the document on a screen, checks the electronic image for legibility and assigns identification information to the image. The document image is then transferred

ILLUSTRATION BY JON MCINTOSH

> ***The federal government estimates that if all of its documents were filed in filing cabinets placed side by side, the cabinets would extend more than 1,000 miles.***

from the magnetic disk buffer to an optical disk located in one of the disk jukeboxes.

The identification information assigned to the document is entered into the image index, which serves as the image system data base. Depending upon the architecture used, the image index resides on the image system or is located in the mainframe data base management system. Wherever it resides, the purpose of the index is to track vital information about the image and provide a logical means for retrieving the document.

The system administrator or an automated job scheduling module routes document images to specific departments or individuals. The routing of images corresponds to the physical paper flow previously used when documents were in paper form.

Using the work flow software, which is either custom developed or vendor supplied, high-priority documents can be moved to the top of the work queue or scheduled for the next available worker to process. Time limits can be assigned so that work in process moves quickly from one worker to another. Summary data is generated to track the time required to move documents through the organization and provide an electronic means to identify and eliminate work bottlenecks.

Once processed, document images reside on optical disks until recalled by end users. End users would locate an image using the image index software. The image index can stand alone or, in some situations, can be integrated with DP applications. For example, the worker could access a mainframe data base that points to electronically "stapled," or merged, images stored on the system. In either case, the image index can provide an access path to the image.

Once the document is retrieved, it can be viewed on high-resolution workstations. In some instances, the terminal can provide a window to mainframe DP applications. Additionally, some image systems software allows word processing to be used to overlay text on the image. If a hard copy is desired, the image can be routed to high- or low-speed laser printers for output.

Business needs

Organizations have many different needs for digital image systems, depending upon the applications and the business environment. End-user requirements have a direct impact on the specific design for the system architecture, peripheral devices, application software and system interfaces.

In general, there are five basic types of business needs for digital image systems:

- Transaction processing.
- Records management.
- Office automation.
- Manufacturing and engineering drawings.
- Information distribution.

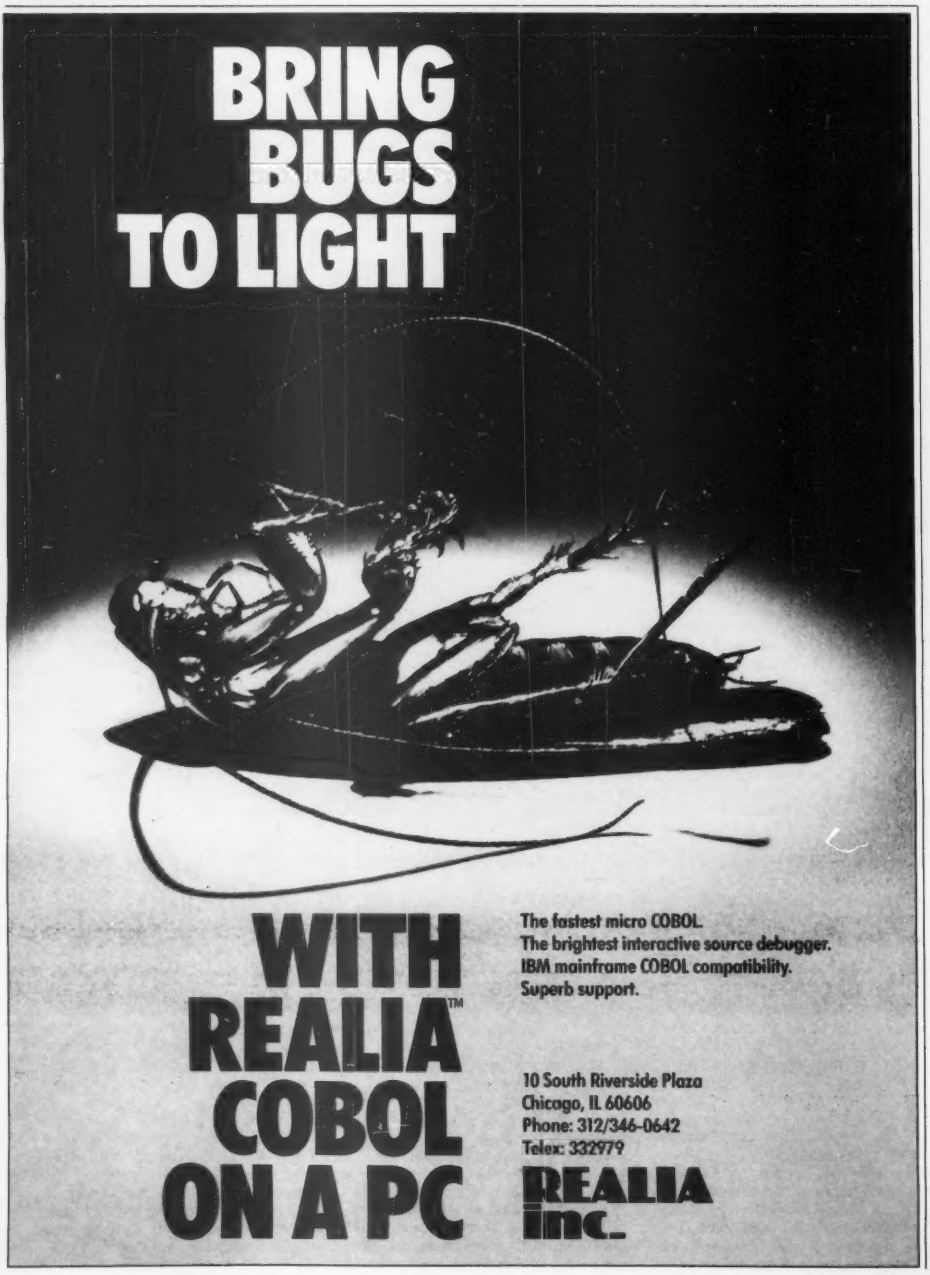
Transaction processing refers to applications in which incoming documents need to be matched with existing information, routed throughout the organization, processed quickly and stored for subsequent retrievals.

Typically, these applications are key business functions that are essential to the overall business operation. In most instances, the business activity has already been automated to a large degree using data processing systems, and the next step is to integrate the manual paper flow into the automated system.

Digital image systems for these applications must provide high throughput, reliability, fast response time and, ideally, integration of OCR with image scanning. In almost all transaction processing applications, the document images must be fully integrated with data processing applications in order to process information quickly in a cost-effective manner.

Transaction processing operations generally are found in large service companies that process millions of incoming documents per year; insurance policies and claims are examples of transaction processing applications.

The emphasis in **records management** is primarily archival. Most



organizations with this focus are trying to convert either inactive paper archives or micrographic archives to digital images.

In records management applications, the primary focus is on saving storage space, reducing clerical filing activities and the time required to retrieve files, providing users with simultaneous access to paper files and eliminating redundant copies of information and costly shipping and handling charges for long-distance paper distribution.

Often the image system does not need to be integrated with mainframe applications, because image retrievals are infrequent and can operate on a stand-alone basis. However, the records management system should be designed to receive and archive alphanumeric data and text from word processing and data processing systems. To do so, the image system may need interfaces to other automated systems within the organization.

Archival records that may require long-term digital image storage include purchasing documents; time-dependent documents; books, magazines and other publications; reference manuals; customer records; personnel and administrative files; shipping receipts; and accounts payable invoices.

For some time, the **office automation** vendors have advocated the processing of text, data, voice and images within an office environment. Terms such as "compound documents," "electronic file folders," "electronic stapling" and "electronic envelopes" are frequently used to describe documents containing related information in image, text, data and voice formats.

However, almost no office automation products can handle compound documents that consist of all four types of information. For example, a single compound document should be able to overlay text on images, place graphics in spreadsheets and integrate annotated voice messages.

The few office systems products that offer imaging capabilities, such as IBM's Distributed Office Support System and Wang Laboratories, Inc.'s Professional Image Computer, seem to be deficient in several areas. In the long term, image technology using optical disks may become integrated with existing office automation systems, but the major OA vendors currently do not offer the products to meet most organizations' imaging requirements for OA applications.

> ***Once transmission obstacles are overcome, electronic image access will allow rapid delivery of handwritten signatures and information, graphic presentations and other documents.***

Manufacturing and engineering organizations have unique requirements for digital image systems. Typical documents that may need to be stored, retrieved and displayed on an image system include engineering drawings in paper dimensions ranging from A-size through E-size, CAD/CAM files, design documents, technical manuals, topographical images, inventory parts diagrams, architectural drawings and blueprints.

The requirements for most engineering image systems include on-line document storage capabilities for alphanumeric text, interfaces to CAD/CAM devices, aperture card scanners, scanners for E-size drawings, high-resolution display terminals of 400 pixels per inch, the ability to transfer between

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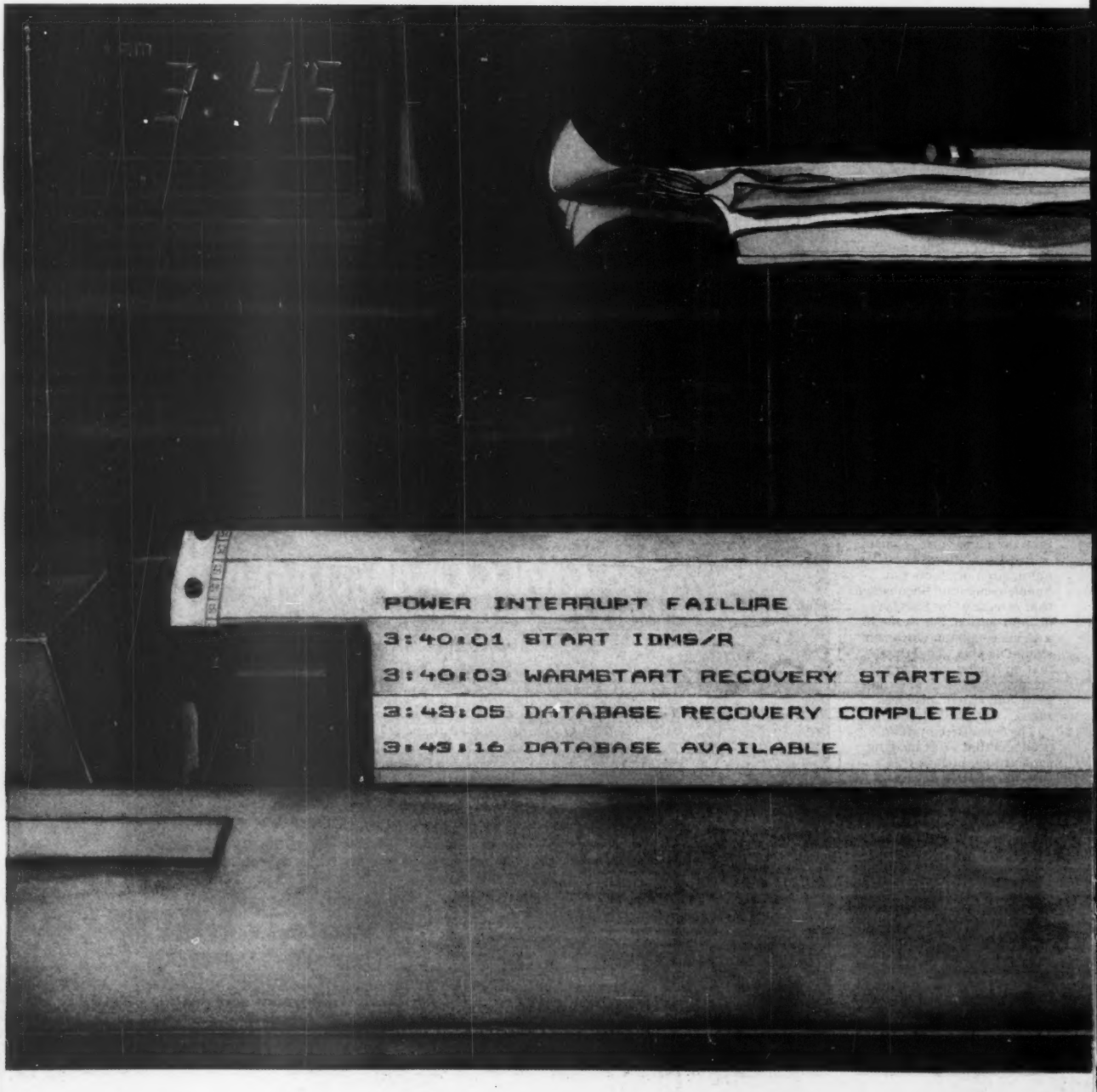

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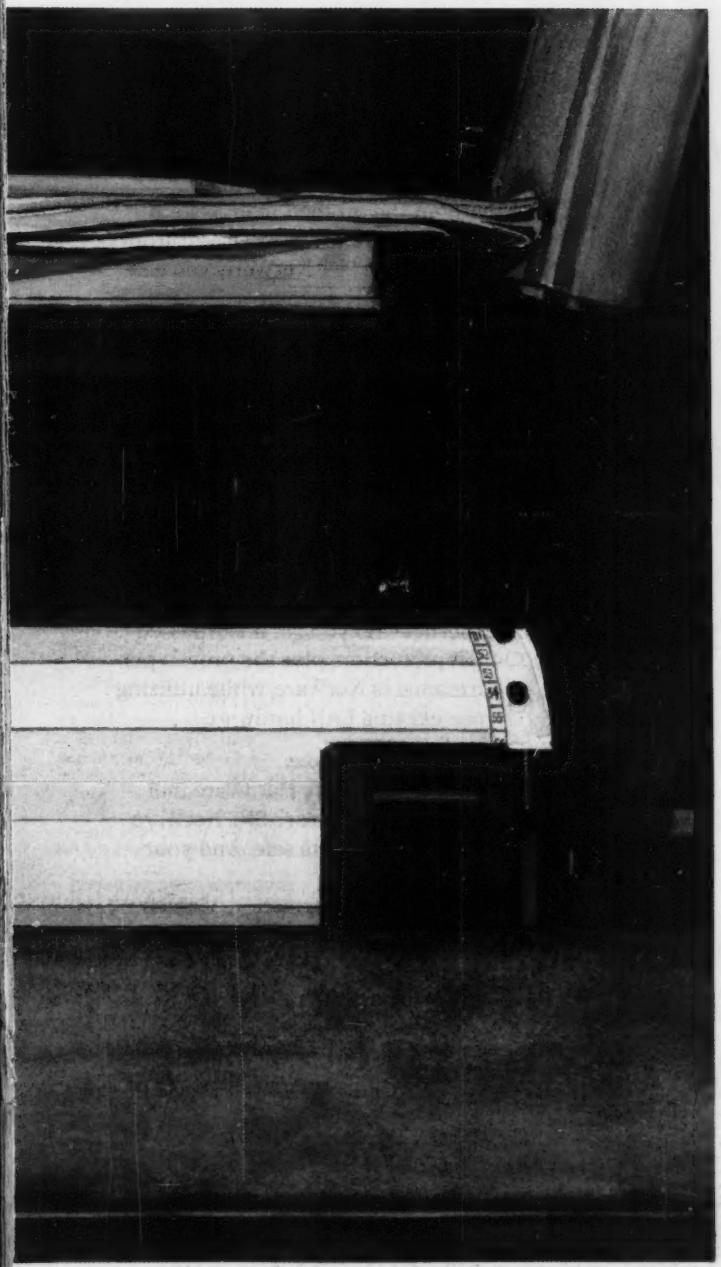

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raster format and vector graphics and the ability to update active drawings.

Some organizations are turning to digital image processing systems as a vehicle for **information distribution.** This application grew out of the need to distribute reference data/text/image information to a wide number of users.

For example, the U.S. military services are interested in distributing maintenance manuals with text and images to all military sites where equipment must be maintained. This type of system could significantly reduce printing and distribution costs associated with disseminating manuals throughout the world.

In the commercial sector, the publishing community has been very active in promoting the idea that read-only optical disks can be used to disseminate data, software and images throughout geographically dispersed installations. Much of the printed material used to publish books no longer exists in type format, so image distribution often is the only realistic means of electronic publishing.

User organizations

As image technology becomes more widespread and standard products become more available, image processing applications will increase in most large businesses and offices. Organizations that currently have a pressing need for digital image systems include insurance companies, financial institutions, manufacturing and engineering companies, service companies and government agencies.

Insurance companies. Image processing is ideally suited for insurance companies, because large volumes of paper are received on a daily basis, paper files are frequently retrieved and updated, and paperwork is retained for a specific time period ranging from a few months to the duration of an insured individual's lifetime.

Possible transaction processing applications for digital image technology include policy, claims and underwriter processing. Records management applications can include correspondence, personnel records and administrative records storage.

Because insurance companies are advanced users of office automation equipment and microcomputers, image processing for OA applications is a logical choice.

Financial institutions. Large financial institutions have a significant need for digital image equipment

> ***The publishing community has been very active in promoting the idea that read-only optical disks can be used to disseminate data, software and images throughout geographically dispersed installations. Much of the printed material used to publish books no longer exists in type format, so image distribution is often the only realistic means of electronic publishing.***

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In any case, don't evaluate a 4GL by itself. Evaluate it in relation to the other products that are required to satisfy your total information needs. Do they share a common architecture or syntax? Were they designed together, or are they simply marketed together? And most important of all, how do people like working with them?

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> ***Many of the operational installations for digital imaging systems are located in government organizations. Key government agencies have already proven that the technology works in pilot installations and have documented the cost savings realized through the equipment use.***

because of the large volume of documents they receive on a daily basis. Many of these documents, such as checks and credit card receipts, are mailed to customers on a periodic basis. A growing trend in financial institutions is to reduce costs through the use of descriptive billing, whereby document images are archived and customers receive an itemized statement rather than the original documents.

Other financial applications include storage for mortgage loans, installment loans, bank-by-phone records, credit card receipts, signature cards, contracts, trust department records and personnel files.

Engineering and manufacturing companies. These companies could use digital image systems to store different types of drawings and documents. The primary manufacturing application would be to store and retrieve engineering drawings and technical data. Transaction processing applications include order entry records, shipping documents and parts ordering. Archival information includes personnel records, job descriptions, publications and shipping data.

Service companies. The initial users of digital image processing in service organizations could include large retailers, wholesalers and distributors; transportation and shipping companies; hospitals and medical centers; overnight delivery companies; hotel and restaurant chains; telecommunications companies; and large universities, libraries and museums.

Transaction processing is the major business need for these companies. Representative applications include routing and distribution, ordering by phone, order processing and customer records and billing.

Government agencies. The federal government's image processing requirements are expanding rapidly and are not expected to diminish in the foreseeable future even though the Gramm-Rudman budget cutbacks have affected procurement budgets. The government agencies need image processing systems to provide a means for organizing, storing, retrieving and disseminating information collected from outside its ranks.

Many of the operational installations for digital imaging systems are located in government organizations. Key government agencies have already proven that the technology works in pilot installations and have documented the cost savings realized through the equipment use.

According to Bill Hooton, director of the Optical Digital Image System Project for the National Archives, an estimated 3% of all government documents are considered to be permanently valuable and as such must be stored indefinitely. As of 1983, the archives estimated that the document storage space for all government agencies totaled more than 22 million cubic feet, at a storage cost — excluding personnel — of $13.42 per cubic foot. That same year, the Federal Records Center, the final repository for government records, utilized storage space totaling 14.4 million cubic feet of space, at $1.06 per cubic foot.

The Federal Records Center's estimates for 1985 show that 1.34 million cubic feet of records were transferred to the center from federal agencies — a figure the center f ıds inadequate. Hooton, who is also chairman of the DIAG users group, explains that because of this inadequacy, the National Archives is turning to

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digital image processing as a way to speed record intake and is currently in the process of procuring a digital image system.

Several organizations have moved to the next implementation phase and are in the process of planning and designing production image processing systems. The Patent & Trademark Office is planning to use digital image systems to store patent designs. In addition, the Army and Air Force, in a joint effort, are installing a multisite image system to store and access engineering drawings. Because a number of government agencies endorsed this technology at an early stage, the use of digital image systems in federal government is more advanced than in private industry.

Image processing systems are also needed in state and local governments. Many of the problems encountered in the federal government are experienced at lower levels. Several states are planning to install image processing systems. Potential image processing applications for state governments include vehicle and driver's license records, tax forms, prison records, land planning and zoning, educational records and unemployment compensation records.

Implementation approach

Because digital image technology is in its infancy, many of the available products are not ideally suited for all business needs and applications. To determine whether an image system is appropriate for a particular application, an organization should identify the overall business objectives, determine key success factors and ensure that the proposed image system fits into the overall information plan. If an image system is to be implemented, the organization must carefully manage the

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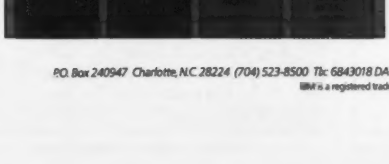

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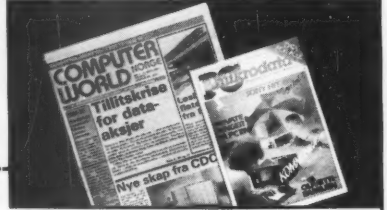

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> ***As organizations move ahead in applying new technologies and developing new systems, MIS should develop the skills needed to plan, design and install large-scale image processing systems. MIS personnel should begin to educate end users in the potential applications of digital image processing as well as caution users about acquiring vendor-designed solutions before their system requirements have been thoroughly identified and analyzed.***

project to ensure a successful installation.

As in any major system, the stages in the image system development process are planning, design and installation. Key steps in the planning phase include the following:

- Survey the image processing technology.
- Identify image processing technical and user requirements.
- Develop an image processing equipment strategy.
- Develop the conceptual system design.
- Estimate costs and benefits.
- Develop an organization plan.

Once the planning phase is completed, the business can determine whether the cost and benefits justify continuing the project. In most instances, the cost and benefits are confirmed through a research and development test installation or a pilot system installed in a small department.

If the project is to be extended, the design phase should be initiated, implementing the following steps:

- Prepare the functional specifications.
- Design the system and software architecture.
- Select the image processing hardware.
- Develop a conversion approach.
- Develop an installation work plan.
- Confirm the costs and benefits.

The installation phase is undertaken once the cost and benefits are confirmed and management approval is obtained. Key installation steps include the following:

- Complete the design of the system in detail.
- Install the integration software.
- Prepare user procedures.
- Install the image hardware and operating software.
- Test the system.
- Convert files.
- Train users.
- Convert the system to production status.

Vendors

Digital image processing technology holds a lot of promise, and the number of peripheral manufacturers is increasing at a rapid pace. However, user organizations cannot install an image system merely by connecting the system components. Either standard or custom-developed hardware is required for the image components to work as a system.

Currently, the number of standard products for digital image processing is limited. The industry leader in standard-product installations is Filenet Corp., a start-up that helped to develop the marketplace for digital image systems. Other firms that have introduced turnkey products or are developing systems include Eastman Kodak Co., 3M Corp., Cygnet Technologies, Inc., Access Corp. and several Japanese companies that sell through U.S. distributors.

An alternative to a standard product is a custom-developed image processing system designed to meet unique requirements. In addition, some of the large federal government procurements have been awarded to the more traditional systems integrators.

More companies are becoming involved in digital image processing, and it may be only a matter of time before the major vendors offer image processing systems.

Planning for the future

Many factors determine the success or failure of a digital image system installation. Return on investment, increased productivity, end-user acceptance, system performance, equipment reliability and vendor support are only a few factors that influence the overall outcome of a project.

Too often, the well-proven techniques and steps within systems development are overlooked whenever a new technology is introduced. However, in each of the image system development phases, there are critical issues that create an impact on the overall design of the image system architecture, application software, security, performance and interfaces to other systems. It is very important to plan and design an image system carefully in order to maximize its use and create a positive impact on the organization.

Many benefits can be realized through digital image processing, and the technology's future looks very bright. As organizations move ahead in applying new technologies and developing new systems, MIS should develop the skills needed to plan, design and install large-scale image processing systems.

MIS personnel should begin to educate end users in the potential applications of digital image processing as well as caution users about acquiring vendor-designed solutions before the organization's system requirements have been thoroughly identified and analyzed.

Information plans should address the possible future use of image processing technology within organizations. Future large-scale development projects should review image processing technology to determine if the equipment is the appropriate technology to meet technical and end-user requirements.

All of these steps are needed to develop effective digital image processing systems. If the MIS department becomes involved in this new technology, it may be finally possible to begin the process of automating our "paper factories." ■

MANAGEMENT

TAKING CHARGE
David Ludlum

Portrait of the CIO as manager

"What's in a name? That which we call a rose
By any other name would smell as sweet."

— William Shakespeare, *Romeo and Juliet*, II, II, 43

The converse of these frequently repeated lines is also true — calling something a rose doesn't make it smell sweet.

The same holds true for a prevalent catchphrase in the world of information systems management — "chief information officer," usually referred to as CIO.

Creating the position doesn't necessarily mean the person who fills it functions according to the CIO concept, according to some top information system executives and consultants who took up this question at a recent Executive Roundtable, held by The Information Group, Inc. of Santa Clara, Calif.

First, the CIO concept. There was a consensus that the basic function of a CIO is to counsel the chief executive officer on a company's technological requirements. This distinguishes him from the traditional information system manager, who is responsible for operating information systems and might report to the chief operating officer.

One roundtable participant equated the role of the CIO with the chief financial officer, while another likened it to the chief planner, acting as the line managers' conscience and taking responsibility for some of their actions.

See **PORTRAIT** page 89

Ludlum is Computerworld's *senior editor, management.*

Utility wires execs to data

Desktops keep managers on top of deregulatory changes

By Jeffry Beeler

SAN DIEGO — A public utility last week began installing personal workstations to help its top 18 executives chart the firm's course through the turbulent waters of deregulation.

The workstations, based on IBM Personal Computer ATs, will form part of an executive information system, which officers of San Diego Gas & Electric Co. (SDGE) will use to monitor the utility's increasingly rapid changes.

Scheduled to become operational in about eight weeks, the system will use Command Center — an executive information system introduced early last year by Boston-based Pilot Executive Software, Inc. — to marry the PC ATs with the company's IBM 3083.

On the mainframe, SDGE has installed Command Center's relational data base, which will run under VM/CMS. The workstations, by contrast, will run a set of Pilot-produced menus that each target user will be able to define individually to spotlight needed information in the data base.

The ATs additionally will support a Command Center software module that will turn the selected information into color graphics and thus help SDGE's senior executives track internal activities and identify trends.

Probably the largest share of the firm's graphics will take the form of organizational charts. Why is SDGE attaching so much importance to this seemingly inconsequential category of corporate graphics? Like banks and companies such as AT&T, utilities today are fast ceasing to be regulated monopolies. "We're preparing for a different world, a world of competition that is somewhat new to our industry," explained SDGE's Information Technologies Manager Gary Rinehart.

Deregulation of the utility's business has triggered "tremendous changes in our

See **UTILITY** page 90

Technology key to strategic edge

By David A. Ludlum

LAS VEGAS — Using information technology to gain a competitive edge in business took center stage as keynote speaker Robert L. Crandall, chairman of American Airlines, opened the 1986 National Computer Conference last Monday.

Crandall

Information systems managers and vendors should try to identify business problems that they might help solve, said Crandall, who helped develop American's highly profitable SABRE reservations system.

SABRE generated revenue of more than $100 million last year, he noted.

Crandall, who is also chairman of American's parent company, AMR Corp. of Dallas, gave two examples of problems American is trying to solve: widespread disruptions of its schedule due to weather problems and the need to get aircraft and spare parts to mechanics at least every four days.

He said American sees a market for a worldwide freight tracking system and that "we're excited about information processing for the cable television business, which we have entered in a very small way.

"As we become a larger and larger service vendor, we're going to need more hardware and more software and lots more of your help," Crandall told the NCC audience of systems users and vendors.

He said that while he is concerned about uncertainty, he believes the best years of the information processing industry, as well as the airline business, are in the future. Data processing and communications represent a $300 billion industry heading for its first $1 trillion year early in the next decade, Crandall said.

As for American, its goal is to become a

See **TECHNOLOGY** page 91

INSIDE

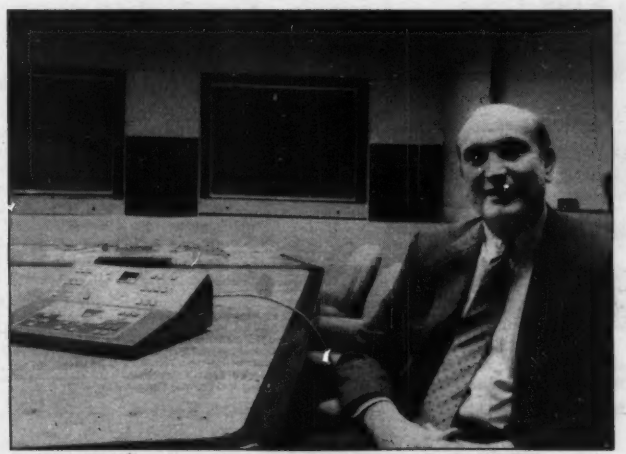
Books: Reviews consider MIS organization, management skills/**87**

Calendar: Conferences, shows, seminars/**88**

INSTANT ANALYSIS

"If the approach from the information systems manager to the executive suite is to say, 'Gee, I have this really neat hardware, here's what we can do with it' . . . that [may] fall on deaf ears."

— Joel P. Friedman, partner, Management Information Consulting Division, Arthur Andersen & Co.



Gary Koenig: Video teleconferencing "cuts down on air travel time."

Video-teleconferenced reports alleviate road-show stops

By Donna Raimondi

After preparing a recent research report on a biotechnology company, the San Francisco brokerage firm Hambrecht & Quist staged a video teleconference on the report between its headquarters and its New York and Boston offices.

The presentation avoided the need for road-show stops in which the brokerage firm's analysts, perhaps with officials of the biotechnology company, would have traveled to the East Coast for several days to talk with institutional investors, according to Gary Koenig, Hambrecht & Quist's manager in Boston.

"In theory, you cut down on a lot of managers' air travel time. In fact, you may not have done those meetings at all because the time level would have been prohibitive," Koenig says.

Video teleconferencing can also speed up the presentation process, he adds. Hambrecht & Quist distributed the report on a Friday, gave the analysts and managers until the Wednesday of the next week to read it and put on the teleconference that same Wednesday.

The technology, which is also put to work in conjunction with initial offerings of stock and other activities, gives the brokerage firm a competi-

See **BROKER** page 91

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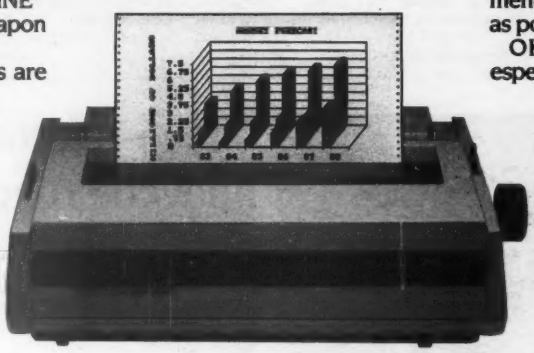

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New books aid managers in organizing information systems

By J. Daniel Couger

The quality of new books on the management of information systems is the most notable improvement in the books listed in the *19th Annual Bibliography of Computer Books* published by the University of Colorado.

The best of the new books on information systems management are both published by Prentice-Hall, Inc. They are *Information Systems Management in Practice*, by Ralph Sprague and Barbara McNurlin, and *A Management System for the Information Business*, by Edward Van Schaik.

Both are valuable additions to a company's library because they have different purposes yet are complementary. The Sprague/McNurlin book is designed to further develop information system managers' knowledge and skills. The Van Schaik book focuses on information system management architecture — on organizing the information business.

Van Schaik's book uses three windows to examine the organization and management of information systems. While the three concepts are fairly well known, the book is the first to examine their comparative relationships and show how a combination of the three can be used.

The primary window is IBM's "information systems management architecture." The second is the "stages of growth" concept. The third is McKinsey and Co.'s "7-S organization concept," which brings a business perspective to the other two windows.

The stages of growth concept was originated by Richard Nolan of the Harvard Business School. He defined six stages: initiation, contagion, control, integration, data administration and maturity.

According to Nolan, many information systems organizations are still locked in late Stage 2, contagion, or Stage 3, control. Larger organizations have taken 15 to 20 years to reach this point, and many have failed to cross into Stage 4. Very few have reached Stage 5, data administration. Van Schaik shows how these information systems learning experiences can be set back by changes within the enterprise as a result of developments such as mergers or the introduction of new products.

McKinsey and Co.'s 7-S concept is composed of seven factors, all beginning with the letter "S." They are the following:

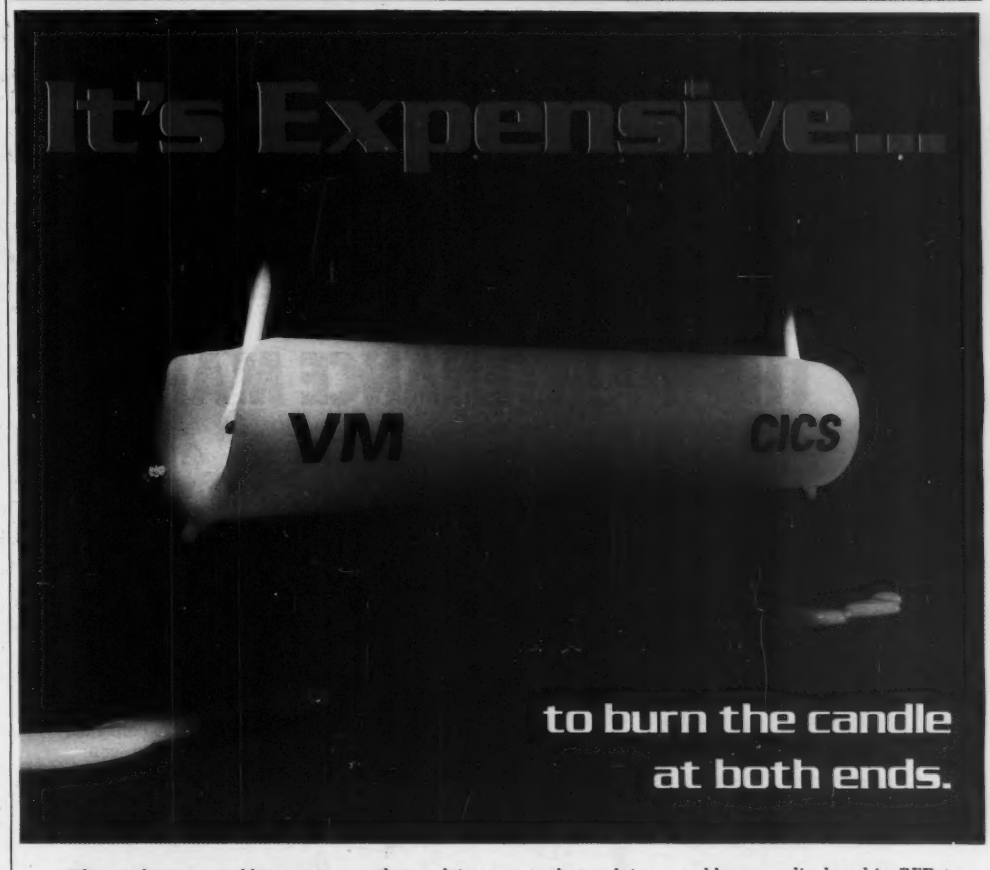
- Strategy. The plan or course of action leading to the allocation of a firm's scarce resources.
- Structure. The character of the organization chart.
- Systems. Standard reports and processes, such as meeting formats.
- Staff. A demographic description of important personnel categories within the firm.
- Style. How key managers behave in achieving the organization's goals; also, the cultural style of the organization.
- Skills. The distinctive capabilities of key personnel or the firm as a whole.
- Superordinate goals. The significant meanings or guiding concepts that an organization imbues in its members.

Only one-sixth of Van Schaik's book is devoted to the stages of growth and 7-S factors, superimposing the seven factors on the stages of growth. Together, the two windows provide a powerful management tool.

The information systems management architecture provides a generic representation of the processes and data that must be managed by the information systems organization. A business process defines the decisions and activities that must be accomplished. If we combine those processes with data, we form a planning and con-

See INFORMATION page 90

Couger is a distinguished professor of computer and management science at the University of Colorado.



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CALENDAR

WEEK OF JUNE 29

JULY 2-3, LAS VEGAS — **Full Meeting of the Design Automation Standards Subcommittee.** Contact: Ron Waxman, Design Automation Standards Subcommittee Co-Chairman, IBM FSD, 9500 Godwin Drive, Manassas, Va. 22110.

WEEK OF JULY 6

JULY 7-9, WASHINGTON, D.C. — **Deregulated Centrex vs. PBX.** Contact: Telestrategies, Suite 100, 1355 Beverly Road, McLean, Va. 22101.

JULY 8-11, COLUMBIA, MD. — **The Technical Manager in a Changing Environment.** Contact: Continuing Education Institute, Suite 102, 21250 Califa St., Woodland Hills, Calif. 91367.

JULY 9-10, NEW YORK — **Online: The Information Connection.** Contact: The Information Systems & Technology Division of the American Management Association, 135 W. 50th St., New York, N.Y. 10020.

JULY 9-11, NEW YORK — **The Fourth Annual PC Expo.** Contact: PC Expo, P.O. Box 1026, Englewood Cliffs, N.J. 07632.

JULY 10-11, LOS ANGELES — **Knowledge Engineering.** Contact: Education Foundation of the Data Processing Management Association Seminars, Dept. KE, P.O. Box 3608, 3420 Kashiwa St., Torrance, Calif. 90510.

WEEK OF JULY 13

JULY 13-18, CHICAGO — **Guide 65.** Contact: Guide International Corp., 111 E. Wacker Drive, Chicago, Ill. 60601.

JULY 14-17, BOSTON — **Software Trends for Executive Planning and Strategy.** Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810.

JULY 16-18, WASHINGTON, D.C. — **SNA Architecture and Implementation Seminar.** Contact: Communications Solutions, Inc., 92 S. Saratoga-Sunnyvale Road, San Jose, Calif. 95129.

JULY 17-18, PALO ALTO, CALIF. — **CD-ROM Product Development: What Does It Take?** Contact: Information Industry Association, Suite 800, 555 New Jersey Ave. N.W., Washington, D.C. 20001.

WEEK OF JULY 20

JULY 20-23, TORONTO — **Directions at Toronto.** Contact: Cincom Systems, Inc., 2300 Montana Ave., Cincinnati, Ohio 45211.

JULY 21-22, SAN JOSE, CALIF. — **Computer-Aided Logistics Support.** Contact: Education Foundation of the Data Processing Management Association Seminars, Dept. CALS, P.O. Box 3608, 3420 Kashiwa St., Torrance, Calif. 90510. Also being held July 24-25 in Los Angeles.

JULY 23-25, BOSTON — **Microtrends '86, Education: Redirecting the Revolution.** Contact: Bobbi Hunt, International Communications Industries Association, 3150 Spring St., Fairfax, Va. 22031.

JULY 23-25, MORRISTOWN, N.J. — **Data Communications: Fundamentals and Beyond.** Contact: The American Institute, Carnegie Building, 55 Main St., Madison, N.J. 07940. Also being held July 30 to August 1 in Los Angeles.

JULY 24-25, ATLANTIC CITY — **Integrated Logistics Support.** Contact: TTS Seminars, c/o Technology Training Corp., Dept. ILS/LSA, P.O. Box 3608, 3420 Kashiwa St., Torrance, Calif. 90510. Also being held July 28-29 in Orlando, Fla., and July 31 to August 1 in Washington, D.C.

JULY 24-25, SAN FRANCISCO — **Advanced Communications Architectures Seminar.** Contact: Communications Solutions, Inc., 992 S. Saratoga-Sunnyvale Road, San Jose, Calif. 95129. Also being held August 19-20 in Washington, D.C.

JULY 24-25, WASHINGTON, D.C. — **EDI Training Session.** Contact: TDCC, 1101 17th St. N.W., Washington, D.C. 20036. Also being held August 21-22 in Arlington, Va.

WEEK OF JULY 27

JULY 27-30, BOSTON — **Recognition Technologies**

See **CALENDAR** page 89

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Portrait of the CIO

From page 85

One of the roundtable session leaders proposed four alternative CIO roles with regard to strategic initiatives and asked the managers to pick the one they follow.

The four were: to champion or sponsor the initiatives; to stimulate discussion of them; to wait for issues to be raised, then jump in; and "to avoid them like the plague." All seven of the information system managers present said they go with the second choice — to stimulate discussion.

With this understanding of the CIO concept, one might question whether it is actually realized when a chief information officer is appointed. One roundtable participant said some CIOs have the title but not the duties, although true CIO use is catching on faster than he expected.

Another, noting that the CIO concept has been hyped in the press, said "it doesn't mean diddly if [CIOs] don't have the respect of their peers." He added that a true CIO must also have a proactive plan for managing technology.

Given these views on the issue of true CIOs vs. bogus ones, one might wonder what attributes make a good CIO. Among the attributes suggested were the following:

- An orientation to the specific business.
- The ability to communicate with executives outside information system operations, both peers and lower-level managers.
- The ability to promote ideas, negotiate and influence others.
- The abilities to delegate and think in terms of long-term strategy.
- Political astuteness or awareness.

After these points were raised, one consultant noted one attribute that had not been mentioned — technical knowledge. Another person said it was assumed that the CIO has some level of technical knowledge and consequently, what that level should be was debated.

That debate was wrapped up with the comment that some technical knowledge is desirable, but that, in many cases, the greater a manager's technical skills, the weaker his more crucial conceptual abilities. As one consultant said, information systems "are scientific; management is art."

After the observation that the CIO must change attitudes toward information technology through face-to-face dialogue, a consultant said the CIO should be able to read the chief executive's body language or the situation.

What does all this boil down to? The consultant just quoted said the information systems manager who becomes a CIO is usually one "with happy users."

Often an assistant information system manager leapfrogs his boss to the position because the assistant has been the one who dealt with users, he concluded.

CALENDAR from page 88

Users Association Forum '86 Summer Session. Contact: Recognition Technologies Users Association, P.O. Box 2016, Manchester Center, Vt. 05255.

JULY 27-31, ANAHEIM, CALIF. — **Third Annual Information Center Conference & Exposition.** Contact: Information Center Conference & Exposition, Weingarten Publications, Inc., 38 Chauncy St., Boston, Mass. 02111.

JULY 28-29, AVON, COLO. — **How to Manage Data and Information as a Resource.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

JULY 28-29, BOSTON — **Fast Algorithms Seminar.** Contact: Technology Training Corp. Seminars, Dept. FA, P.O. Box 3608, 3420 Kashiwa St., Torrance, Calif. 90510. Also being held July 31 to August 1 in Orlando, Fla., and August 4-5 in Washington, D.C.

JULY 28-30, RENO, NEV. — **1986 Summer Computer Simulation Conference.** Contact: The Society for Computer Simulation, P.O. Box 17900, San Diego, Calif. 92117.

JULY 28-AUGUST 1, SEATTLE — **Omnicom Week.** Contact: The Omnicom Institute, Omnicom, Inc., Suite 304, 501 Church St. N.E., Vi-

See **CALENDAR** page 91

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Utility wires execs to data

From page 85

company's culture, philosophy and structure," he said. "Right now, we're in a continuing state of flux," which demands constant scrutiny.

SDGE's system belongs to an infant product category that, though still small, appears to be gaining steadily in popularity. The first executive information system found its way into corporate use during the third quarter of last year. Since then, the number of systems in use has grown to between 40 and 50, according to Ann Morley, editor of International Data Corp.'s monthly software newsletter.

The information systems were developed to address the needs of senior executives. As such, they differ profoundly from most decision support systems, which are aimed mainly at middle managers, according to Robert Kniffin, vice-president of marketing for Pilot Executive Software, Inc.

Internally, the system allows companies to cull material from data bases and check corporate functions and trends. "They are oriented . . . toward tracking projects or controlling financial variables like cost," Kniffin said.

Installation of the system may have repercussions, some of them not entirely pleasant. Because it is geared for information collection and delivery rather than manipulation, it threatens to displace some middle managers, Rinehart said, although he could not predict how many.

The introduction of the firm's executive information workstations hardly marks SDGE's debut in executive-oriented computing. Previously, the corporation furnished chief officers with IBM 3178 and 3270 terminals that supported messaging and scheduling through IBM's Professional Office System.

SDGE had also installed a small-scale executive information system that performed some of the same tasks as the incoming PC ATs. But the existing installation, which ran on a single 8-bit Altos Computer Systems, Inc. ACS 8000, could accommodate only three of the 18 potential users.

The previous system also swamped its users with too much information and made opportunities and problems hard to spot, Rinehart said.

Executive information systems originated as a concept in the late 1960s, but initially made few inroads among users for several reasons, one of which was poor data quality.

Further, executive information systems suffered from overly ambitious first efforts to install the systems.

The turning point started during the late 1970s with the emergence of sophisticated, business-oriented graphics.

Then came the arrival of personal computers, which gave executive information systems further impetus.

According to Richard Crandall, president of Comshare, Inc., another executive information system vendor, the product category became a commercial reality with the recent entrance into the marketplace of Pilot and Comshare. Both vendors announced similar off-the-shelf systems at roughly the same time, he said.

Information systems books

From page 87

trol loop called the information systems management architecture.

The informations systems management architecture begins with setting strategic objectives. These objectives are then translated into tactical objectives for the operation of ongoing services and the creation of new services. These two sets of objectives are consolidated into a plan to achieve them, called resource planning.

More than half of Van Shaik's book concentrates on implementation of the information systems management model, using a hypothetical company. The book is thought provoking and will force information systems managers to re-evaluate their architectural approaches.

The Sprague/McNurlin book is very well written and easily read. Its strengths are the cases and examples from real companies. It is divided into five parts, each dealing with a major portion of the field of information systems.

The authors have kept the material quite practical, giving many examples. The examples are mini-cases that illustrate how companies have put some of the ideas in each chapter into practice. The 501-page book is a valuable addition to information systems management literature.

The University of Colorado bibliography lists more than 1,200 books from 155 publishers separated into 86 categories. Topics include management, programming, artificial intelligence, system analysis, system design and applications. The books also are catalogued by type and style of presentation.

Broker uses video teleconferencing

From page 85

tive edge, Koenig says.

A portfolio manager at a Hambrecht & Quist client in Boston said he feels the technology also gives him an edge.

"I recently watched a video teleconference at Hambrecht & Quist that presented a company just starting out on a road show," says the manager, Rick Spillane of Eaton Vance Management, Inc.

"That company was planning to be in Boston two days later on the actual road show. Having information two days in advance is very important in this business. If the information strikes me as being of value, I can act that much faster than my competitors," Spillane says.

Takes less time

Furthermore, it only took an hour to watch the conference, while it would have taken at least two hours to go to the luncheon when the company came to Boston, according to Spillane.

And many of the video teleconferences he attends are for presentations that are not brought to New York or Boston, so he gets access to information some other Boston managers do not have, he says.

Daily agenda setting

Hambrecht & Quist managers in San Francisco, New York and Boston congregate each morning via video teleconference to set the day's agenda and determine which stocks the company wants to buy or sell, according to Koenig.

Because the market is a real-time situation, the meetings would have to take place one way or another. "The real advantage is the visual contact," Koenig says.

An entire conference room is outfitted with cameras, screens, auxiliary screens for graphics, controls and communications equipment.

Hambrecht & Quist owns the equipment, whose cost Koenig declined to specify, and leases telephone lines for it.

Dedicated lines, satellite

Transmission goes by dedicated telephone line between Boston and New York and via satellite from New York to San Francisco.

The system also allows the firm to tape meetings that take place in San Francisco when the Boston and New York offices have closed and send the tapes by overnight mail to Boston and New York, where they can be played on a videocassette machine the next day.

System has some bugs

The equipment does have some bugs, such as echoes, voice and video breaks and garbled transmission, but most of them can be fixed by minor adjustments, Koenig says.

Maintenance is handled by a staff communications specialist in San Francisco and occasionally by the vendor, Compression Labs, Inc. of San Jose, Calif.

"Occasionally, it breaks down and the whole system doesn't work — about once a year," Koenig says. "It is less common than it used to be."

Technology key to strategic edge

From page 85

fully integrated airline, offering data processing services to other airlines that choose not to get as fully involved in that aspect of the business, Crandall said.

American, which recently signed an agreement to provide Pan American World Airways with computer reservations services through SABRE, is talking with other airlines about doing so for them, Crandall said. However, American sees no advantage in spinning off SABRE, he said.

CALENDAR from page 89

enna, Va. 22180.

JULY 30-AUGUST 1, AVON, COLO. — **How to Build and Use a Data and Information Resource Directory.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

WEEK OF AUG. 3

AUGUST 4-8, ANN ARBOR, MICH. — **Contemporary Data Communication Networks: Planning, Management and Computer-Based Design.** Contact: Engineering Summer Conferences, 300 Chrysler Center/N. Campus, Ann Arbor, Mich. 48109.

AUGUST 4-8, FORT COLLINS, COLO. — **Topics in Manufacturing Systems Engineering.** Contact: National Technological University, P.O. Box 700, 601 S. Howes St., Fort Collins, Colo. 80522.

WEEK OF AUG. 10

AUGUST 11-14, SNOWMASS, COLO. — **AM/FM International Ninth Annual Conference.** Contact: AM/FM International, Suite 820, 8775 E. Orchard Road, Englewood, Colo. 80111.

AUGUST 11-15, PHILADELPHIA — **AAAI-86 Fifth National Conference on Artificial Intelligence.** Contact: AAAI-86, The American Association for Artificial Intelligence, 445 Burgess Drive, Menlo Park, Calif. 94025.

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System Overview

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Storage: Tandy 1200—two 360K floppy drives. Tandy 1200 HD—one 360K floppy and one 10-megabyte hard disk.
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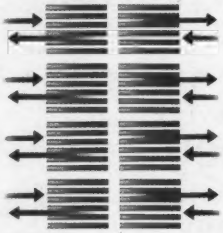
In a conventional database, I/O requests must be handled sequentially. This creates queues that slow response time. In the VLX system, there are multiple paths to multiple disks. Data enters and leaves the database simultaneously. No time is wasted, and all disk space gets used.



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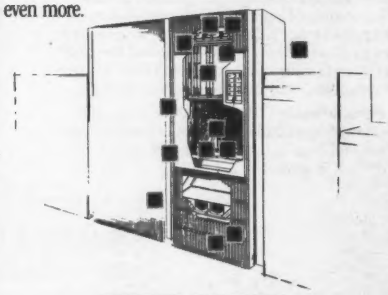
An integrated microprocessor allows us to monitor the system environment from anywhere in the world. We can even run stress tests remotely. If a failure does occur, the VLX has the capability to automatically dial out to remote centers anywhere in our worldwide network.

THE SYSTEM KNOWS THE SYMPTOMS.

Expert systems software, using fault analysis, directs the problem diagnosis systematically. It also allows us to analyze it and shorten service time even more.



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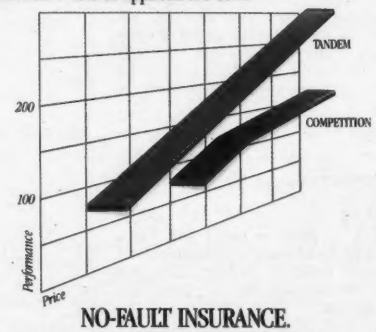
We offer software that will protect the security of your data whether it's in the VLX, in another Tandem system or in transmission.

NO GROWING PAINS.

To add power, just add processors. You can grow from a base four-processor system to 16. From there, you can expand in whatever increments you choose, all the way to 255 systems. You never buy more than you need, and you'll never have to rewrite a line of applications code.



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TANDEMCOMPUTERS

NEW PRODUCTS

Software now runs on 13 boards

Network Software Associates, Inc. of Laguna Hills, Calif., has enhanced its entire family of personal-computer-to-personal-computer and PC-to-mainframe communications software, allowing each product to work with any one of 13 different makes of hardware boards.

The software uses IBM's Synchronous Data Link Control (SDLC) protocol and runs on any IBM-compatible PC.

The new versions of the software products are said to be compatible with SDLC boards from any of the following companies: ABM Computer Systems Co.; AST Research, Inc.; Computer Logics; Emulex/Persyst Corp.; Forte Data Systems Corp.; Frontier; IBM; Pathway Design, Inc.; SSI, Inc.; Techland Systems, Inc.; Trisystems; UDS; and Wang Laboratories, Inc.

The software products now compatible with the 13 different boards include Adaptsna RJE, Adpatsna 3270, Synctalk, Adaptsna PCcom and Adaptsna LU6.2/Advanced Program-to-Program Communication (APPC).

Adaptsna RJE emulates an IBM 3770 remote job entry workstation for mainframe communications and file transfer applications. It costs $585.

Adaptsna 3270 emulates an IBM 3274 controller equipped with a 3278 or 3279 printer for 3270-type mainframe communications and file transfers. It is priced at $585.

Synctalk is a symmetrical communications program for PC-to-PC applications. Synctalk provides file transfer and remote IBM PC-DOS capabilities at 9.6K bit/sec. Synctalk costs $195.

Adaptsna PCcom provides direct SDLC PC-to-PC communications, file transfer and remote PC-DOS capabilities at 19.2K bit/sec. Adaptsna PCcom costs $475.

Adaptsna LU6.2/APPC is an implementation of IBM's Logical Unit 6.2 protocol, including a number of APPC functions. Adaptsna LU6.2 costs $795.

Multiple-quantity discounts and site licenses are available, the vendor said.

Uccel expands Infopoint line

Five packages added for banking applications

Uccel Corp. of Dallas has added five Infopoint series software products to its Infopoint banking applications line.

According to the vendor, the Infopoint Profitability package for the information management system (IMS) environment addresses such functions as customer relations, profitability analysis, service charging and cross-selling. It is priced at $215,000.

The Infopoint Combined Statement software is said to provide detail and summary reporting on any group of related accounts on a single statement. It is priced from $35,000 and will be available in December.

A third product, Infopoint Combined Interest Reporting, provides the means to combine customer and account information for financial institutions to meet Internal Revenue Service regulatory reporting requirements, the vendor said. This product is priced from $30,000 and will be available in September.

According to the vendor, Infopoint Infoloans is an integrated commercial, consumer and mortgage loan and dealer floor planning product that can be purchased separately or collectively. Infopoint Infoloans is priced from $150,000 and will be available in the fourth quarter of this year.

The fifth package, Infopoint ACH, is an automated clearinghouse product that is said to process electronic transfers. It was designed to make use of private sector processing capabilities. Pricing for this product begins at $80,000. It, too, will be available in the fourth quarter, according to the vendor.

According to Uccel, the Infopoint series is composed of more than 20 software products spanning deposits, transactions, loans and financial management. It also provides multiple-application support software, making possible such activities as cross-application profitability measurement, combined statements, combined interest reporting and ad hoc reporting.

According to a company spokesman, Uccel is planning to introduce three additional Infopoint series products in 1987, including Customer Management, Enterprise Management and a Transaction Management System.

Autocad bows for 3270 PC AT

Autodesk, Inc. of Sausalito, Calif., has introduced a version of Autocad, its computer-aided design software, for the IBM 3270 Personal Computer AT, 3270 PC AT/G and 3270 PC AT/GX.

The company also announced a driver update for the IBM Personal Computer version of Autocad that contains drivers for the Autodesk Device Interface (ADI) and 17 graphics peripherals from third-party vendors.

According to a company spokesman, Version 2.18 of Autocad costs $2,500 and is compatible with Version 3.2 of the IBM 3270 PC Graphics Control Program, said to support extended memory address capability and to allow up to four operations to be executed concurrently.

With Version 2.18, users can convert an Autocad on-screen display into an IBM Picture Interchange File (PIF) format. PIF is supported by IBM's graphics editors and document processors. Users can also transmit Autocad drawing files to mainframe graphics programs and peripherals with Version 2.18, the vendor said.

The driver update, which is currently offered as a separate disk for $80, provides support for the ADI Display Interface, an interface specification used to develop display drivers for Autocad.

Additionally, the update disk includes drivers for such third-party peripherals as the Hewlett-Packard Co. Laserjet Plus laser printer, the Number Nine Computer Corp. NNIOS Graphics Display, the Wyse Technology, Inc. WY-700 Graphics Display and the Scriptel Corp. SPD Tablet.

INSIDE

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SOFTWARE & SERVICES

Systems software

IMSL has announced that its **IMSL Library, SFUN/Library** and **Protran** problem-solving systems have been ported to the IBM RT Personal Computer.

The IMSL Library and SFUN/Library are said to provide a selection of mathematical and statistical Fortran subprograms. The Protran systems were designed for mathematics, statistics and linear programming.

The software uses the IBM RT PC Fortran 77 compiler under the AIX operating system.

A first-year license costs from $850 to $1,200, renewable from $550 to $1,000.

IMSL, 2500 Parkwest Tower One, 2500 Citywest Blvd., Houston, Texas 77042.

■

Global Software, Inc. has introduced **Vista**, an information retrieval software product for IBM mainframes and minicomputers.

Vista is said to include such features as password security and a data access design that allows greater control of data. The menu-driven system also facilitates on-line access of information across various applications.

Vista is packaged to allow access to specific-application or multiple-application data files.

Vista runs in the DOS and OS environments.

Vista for DOS costs from $25,000 to $50,000; for OS it costs from $30,000 to $60,000.

Global Software, 1009 Spring Forest Road, Raleigh, N.C. 27609.

■

Syncsort, Inc. has announcd **Release 1.7** of **Syncsort DOS,** its sort and merge program for IBM DOS/VS environments.

Release 1.7 is said to offer improved serial I/Os, problem-state CPU time and supervisor-state CPU time. It is also said to provide new installation and maintenance procedures and enhanced Sortwrite and record formatting capabilities.

Other new features include the ability for work data sets to be opened dynamically and support for ASCII tape I/O files and spanned variable-length records in I/O files.

Release 1.7 of Syncsort DOS is licensed at $5,000 for three years.

Syncsort, 50 Tice Blvd., CN18, Woodcliff Lake, N.J. 07675.

Languages

Michaels, Ross & Cole Ltd. announced **MRCQL**, an SQL implementation for the IBM System/38.

MRCQL allows users to define and modify reports through its nonprocedural command structure. According to the vendor, it is integrated to the MRC-Query series fourth-generation language and allows a range of reporting, from the simplest reports to free-formatted reports to externally described printer files and RPG-III programs.

Other features include Help key documentation, multilevel security, multifile reports, Boolean selection criteria and pagination.

MRCQL is priced at $3,440.

Michaels, Ross & Cole, Building E, Suite 304, 800 Roosevelt Road, Glen Ellyn, Ill. 60137.

Utilities

Software Technologies & Research, Inc. has announced **Release 1.3** of the Dynamic Allocation/Deallocation Subsystem (DADS) designed for use with CICS.

The release features transient data extrapartition data set support; dynamic Oscore adjustment option; batch interface queued request processing during CICS start-up; batch control file maintenance and copy utility with on-line support for DL/1 RecoverDB and DBRC global options; and a multiple DSname version option.

Release 1.3 of DADS is priced at $5,000, the vendor said.

Software Technologies & Research, 160 West St., Cromwell, Conn. 06416.

■

Dodson Consulting has announced **DCmenu**, a fourth-generation methodology tool said to provide a framework for developing the menus of information systems based on Information Builders, Inc.'s Focus fourth-generation language.

DCmenu reportedly enables users to run, maintain and document the menus for multiple systems from one Focus data base; prototype all the menus for a system; assign user access codes to each menu selection; go to any menu in a system; and bypass any menu level. It can also execute CMS Execs or TSO Clists.

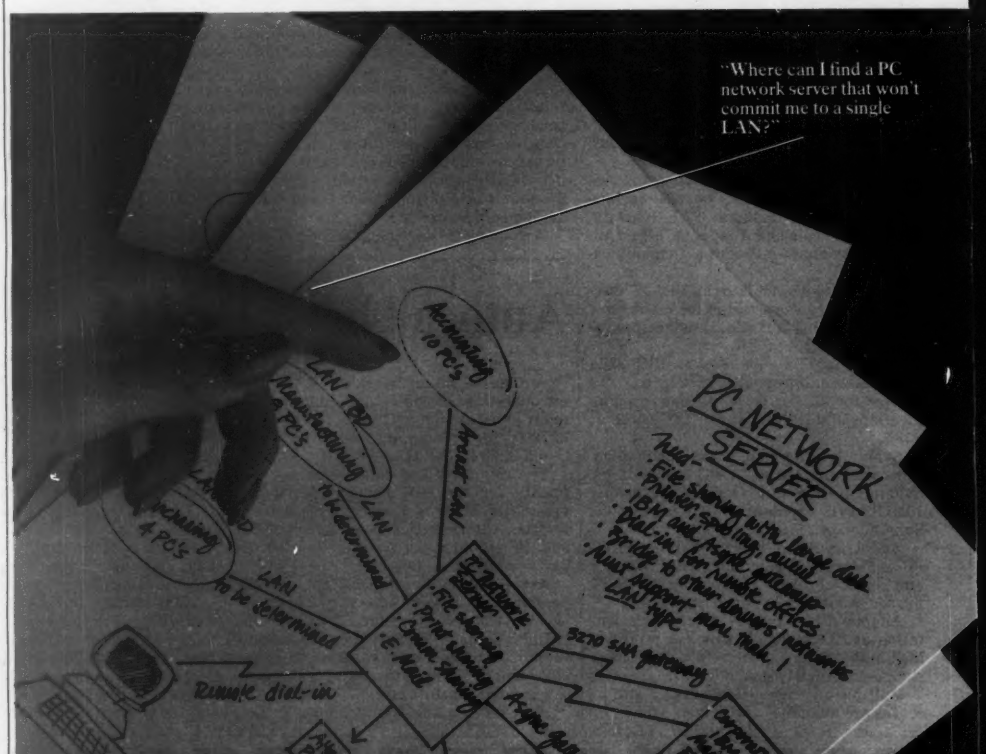
DCmenu runs on IBM mainframes with Focus Release 5.0.2 under VM/CMS or TSO. It costs $595, including source code.

Dodson Consulting, 3434 Huntertown Road, Allison Park, Pa. 15101.

■

Help/38 has introduced **RPG V**, a software system for the IBM System/38, said to provide free-form coding in IBM's Source Entry Utility (SEU), RPG V super-shorthand coding and 10 SEU enhancements.

Reportedly, programmers can code RPG V or free-form RPG in SEU. RPG V automatically checks the syntax and generates formatted RPG-III code on the screen. In the free-form mode, RPG V lets users insert 100 lines of code in SEU without being aware of RPG column locations.



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With LANMASTER, you're no longer locked into yesterday's LAN decision. Or today's.

And that's a smart way to face tomorrow.

The SEU enhancements include the ability to get into the command entry screen while in SEU, instant command execution from SEU and an SEU notepad.

RPG V costs $995 per CPU.

Help/38, 210 Baker Technology Plaza, 6101 Baker Road, Minnetonka, Minn. 55345.

MICROCOMPUTERS

Systems

Integrated Business Computers has announced the **Multistar 4 series** of microcomputers to support multiuser applications.

The Multistar 4 series is made up of Theos Software Corp.'s Theos 8-based Multistar 4 and Multistar 4T. The systems are said to support an 8-MHz Zilog, Inc. Z80 CPU with 256K bytes of memory, a hard and floppy disk controller and four serial ports. The Multistar 4T also is said to feature a 60M-byte streaming tape drive.

Multistar 4 costs from $3,000 for a 25M-byte system to $3,750 for a 50M-byte system. The Multistar 4T costs from $5,000 for a 25M-byte system to $5,750 for a 50M-byte system.

Integrated Business Computers, 21621 Nordhoff St., Chatsworth, Calif. 91311.

Software applications packages

PC Productivity Systems announced **Crossroads**, a software package for mechanical engineering applications.

Crossroads enables users to perform operations such as transformation, surfacing and mass properties analysis using a mouse, icons and drop-down menus. All construction takes place with a Z-axis, and multiple windows allow up to four views of the same part at one time.

Crossroads runs on the IBM Personal Computer XT, AT and compatibles under Microsoft Corp. MS-DOS 2.0 or higher. It costs $2,995.

PC Productivity Systems, Suite 200, 5252 Orange Ave., Cypress, Calif. 90630.

■

Business Systems International has announced **Lasersoft/Data Entry**, an application software package that reportedly allows a microcomputer to act as a data entry device for the completion of electronic forms on laser printers.

According to the vendor, the software allows users to design a form, type the information onto a personal computer or workstation and have the data completely superimposed on the form. The laser printer then prints the completed form.

Lasersoft/Data Entry costs $495.

Business Systems International, 20942 Osborne St., Canoga Park, Calif. 91304.

■

Skok Systems, Inc. has announced **Drawbase**, an integrated computer-aided design, drawing and data management software program.

Drawbase is said to create two-dimensional designs and drawings and simultaneously track associated nongraphic information. The integrated data management system includes an interface to Lotus Development Corp.'s 1-2-3 and Symphony.

Other features include pop-up windows, on-screen indicators and on-line Help.

Drawbase runs on an IBM Personal Computer AT or a Hewlett-Packard Co. Vectra PC. Two monitors are recommended; one for graphic display and one for nongraphic information.

Drawbase costs $4,995.

Skok Systems, 222 Third St., Cambridge, Mass. 02142.

■

Clear Lake Research has announced **CLR Anova**, an analysis of variance program for the Apple Computer, Inc. Macintosh computer.

According to the vendor, CLR Anova allows users to perform analyses of variance computations and follow-up procedures such as range tests and contrasts. It can compute up to a 10-factor analysis with unequal sample sizes and repeated measures. Plots of interactions can be drawn.

CLR Anova is priced at $53 through August. Beginning in September, the price will be $78.

Clear Lake Research, #127 5615 Morningside, Houston, Texas 77005.

■

Pearlsoft, Inc. has announced **Basic Accounting**, a six-module, user-customized accounting software package said to be capable of running stand-alone or integrated with Ashton-Tate's Framework II.

Basic Accounting combines general ledger, accounts payable, accounts receivable, invoicing, inventory and payroll modules with Flexset, a fourth-generation natural language customization module.

The Basic Accounting package is priced at $995.

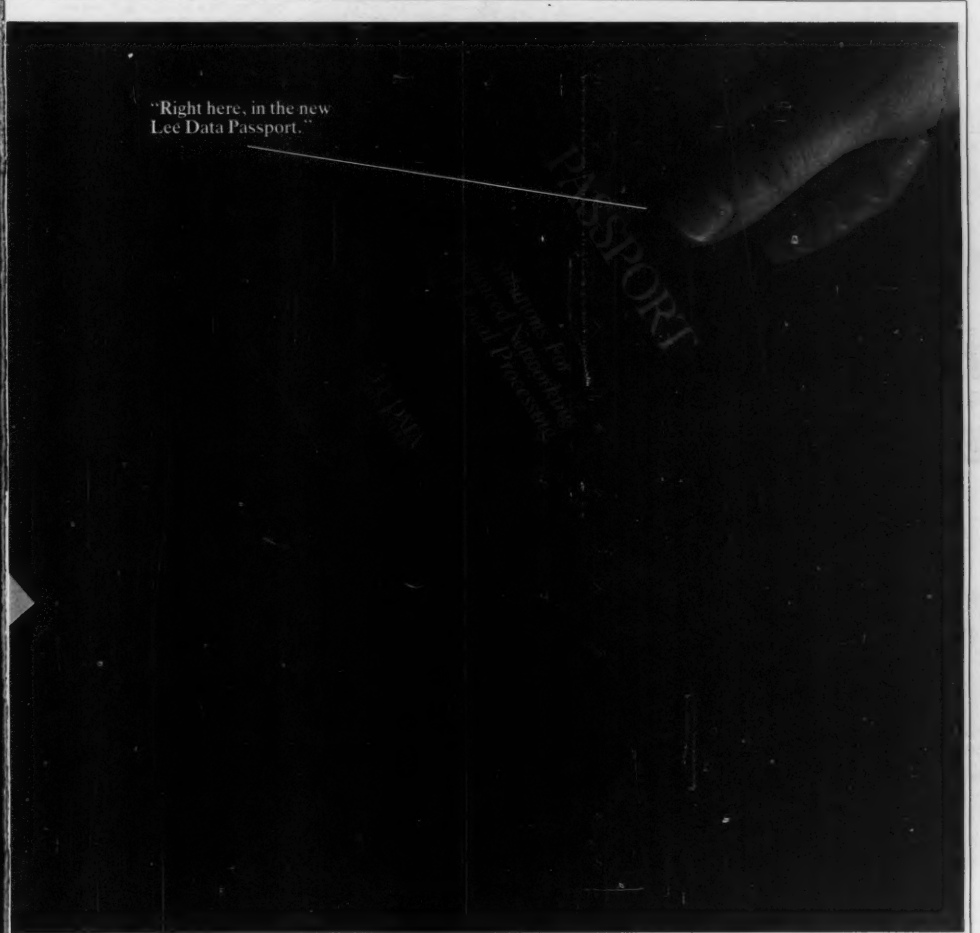
Pearlsoft, P.O. Box 638, Wilsonville, Ore. 97070.

■

Sapana Micro Software has released its **Mail-Track-II with Lettermerge II**, a mailing list management package for IBM Personal Computers and most compatibles.

The program includes features that handle U.S., Canadian and foreign addresses and merged and split mailing lists. It keeps mailing lists in ZIP and postal code order and allows up to eight control codes. The program costs $95.

Sapana Micro Software, 1305 S. Rouse, Pittsburg, Kan. 6672.



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NEW PRODUCTS/MICROCOMPUTERS

Business & Professional Software, Inc. (BPS) has announced that **35mm Express**, its presentation graphics software package for IBM Personal Computers and compatibles, now supports the Apple Computer, Inc. Laserwriter laser printer.

Reportedly, 35mm Express users can now produce black-and-white paper handouts and overhead transparencies.

Users can scale images down to any size and place them anywhere on a page, the vendor said.

The Laserwriter produces text and graphics at 300 dot/in.

It has three read-only memory-resident fonts and will offload a batch of up to 32 images.

The 35mm Express Laserwriter driver diskette is priced at $45, according to the vendor.

Business and Professional Software, 143 Binney St., Cambridge, Mass. 02142.

Microcomputer Graphics, Inc. has introduced the **MGI/CADD** drafting program, a combination of the MGI/Schematic Drafter and MGI/Mechanical Drafter programs.

MGI/CADD is said to be able to draw fillets and tangents with a single keystroke. New line styles and variable text sizes are standard features. The MGI/CADD market includes architects and engineers as well as schools and industries. According to the vendor, familiarity with computers is not necessary to operate MGI/CADD.

MGI/CADD costs $895.

Microcomputer Graphics, 13468 Washington Blvd., Marina Del Rey, Calif. 90292.

■

IGC Technology Corp. has introduced **Pegasys LX**, a computer-aided design and drafting system for use with AT&T's Unix Personal Computer Models 7300 and 3BI.

Pegasys is said to include such features as intelligent drawing structure, a macro language, assignable variables and an on-line calculator to facilitate development of user-defined applications. Pegasys is menu driven.

The Pegasys software package costs $2,900. The combined hardware and software package costs $9,500.

IGC Technology, 305 Lennon Lane, Walnut Creek, Calif. 94598.

■

C. R. Smolin, Inc. has introduced **E-Z-CRP**, a capacity-requirements planning system that operates as an add-on module to the company's E-Z-MRP material-requirements planning system.

The E-Z-CRP is said to determine the day-by-day utilization of the user-defined work centers by calculating the work center capacity, the user-defined routings and the total manufacturing requirements. E-Z-CRP produces reports in tabular and graphic forms.

E-Z-CRP operates on any IBM PC-DOS- or Microsoft Corp. MS-DOS-based microcomputer.

E-Z-CRP costs $995.

C. R. Smolin, Suite J, 7760 Fay Ave., La Jolla, Calif. 92037.

■

McDonnell Douglas Corp. has introduced **Orderxchange**, a communications software sales tool designed to speed the order entry process and reduce errors.

Users can place orders from any location by using an IBM Personal Computer, a PC Convertible laptop or compatible and a modem.

The cost for installing the base system is $10,000; cost for placing an order through Orderxchange ranges from 15 cents to $1.25.

McDonnell Douglas, 20705 Valley Green Drive, Cupertino, Calif. 95014.

■

CHI/COR Information Management, Inc. has released **Recovery/1**, a microcomputer-based software system used to maintain a comprehensive disaster recovery plan.

Recovery/1 is said to provide 40 system-supplied reports, including equipment configuration lists, application media profiles and equipment forms.

Recovery/1 is also said to include features such as project management orientation and compatibility with the IBM Personal Computer.

Recovery/1 is priced at $5,000, according to the vendor.

CHI/COR Information Management, 10 S. Riverside Plaza, Chicago, Ill. 60606.

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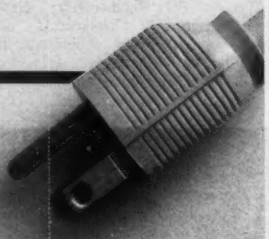

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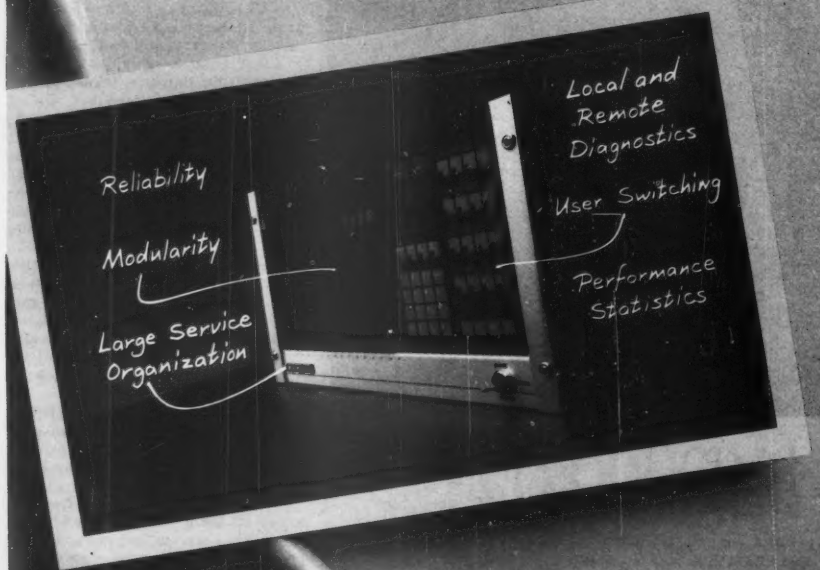

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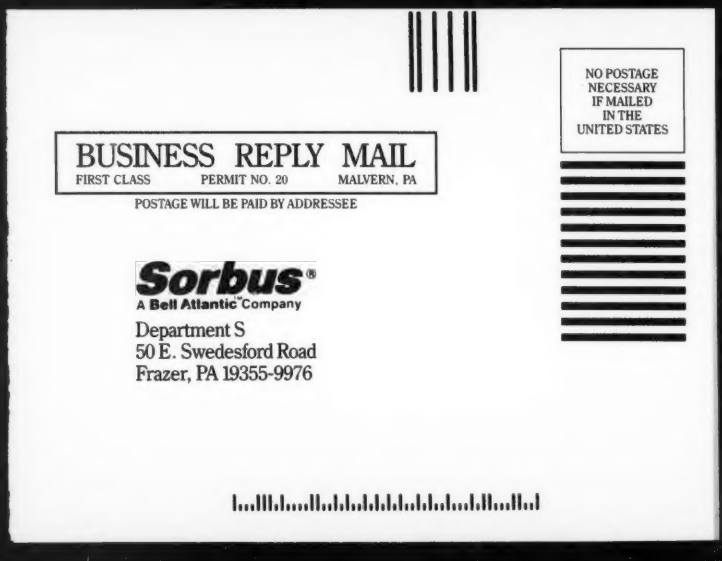

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Software languages

Data Access Corp. has ported its **Dataflex** application development system and fourth-generation language software to Digital Equipment Corp.'s VAX computers.

Dataflex is said to provide mid-range system users with transportable software. The Dataflex program can be used for program generation, report creation and data base management.

Dataflex is also available for microcomputer operating systems, including IBM PC-DOS and AT&T Unix System V.

Dataflex for DEC VAX systems costs $1,800.

Data Access, 8525 S.W. 129 Terr., Miami, Fla. 33156.

Software utilities

Theos Software Corp. has introduced **Theos 286-V**, a software product said to give multiuser capability to Microsoft Corp. MS-DOS programs.

According to the vendor, the 16M-byte memory space of Theos 286-V enables users to keep large programs and data structures in memory for immediate access. Theos 286-V also provides built-in security to users with its memory management and protection features.

Theos 286-V can support 14 to 32 users, the vendor said.

Theos 286-V is priced from $695 to $895.

Theos Software, Suite 100, 201 Lafayette Circle, Lafayette, Calif. 94549.

■

Summit Computer Resources, Inc. has introduced **Disk Censor**, a security and user interface system available for users of IBM Personal Computers, Personal Computer ATs, XTs and compatibles.

Disk Censor is a menu selection system that allows for up to 112 program entries divided over two pages.

The system includes a hardware device that controls the booting process and a resident control program that requires 45K bytes of random-access memory while in operation.

Disk Censor costs $59.95 for the control program and user manual and $59.95 for the expansion card; the network version costs $200 per five workstations.

Summit Computer Resources, 1416 S. Third St., Louisville, Ky. 40208.

■

Cytek, Inc. has announced **Multi-C**, a multitasking library of functions for program developers.

Multi-C is said to link with users' code to provide a multitasking environment in the program. Designated functions become tasks that can schedule other tasks, communicate with each other and use almost all standard C functions.

Multi-C is available for Lattice, Inc., Microsoft Corp. and Computer Innovations, Inc. 8086 C compilers as well as Paragon Technology Corp.'s Z80 C cross-compiler for IBM PC-DOS and Microsoft MS-DOS. It costs $149.

Cytek, Unit 202, 805 Turnpike St., North Andover, Mass. 01845.

National Instruments Corp. has announced **Labview**, a software product for the Apple Computer, Inc. Macintosh.

Labview is said to combine interactive graphics with programming technology developed by National Instruments, called graphical diagramming.

Labview reportedly provides an environment for developing scientific applications that integrate instrument control, data acquisition, data analysis, data entry, data management and report generation.

Graphical diagramming allows the user to draw a diagram and automatically run it.

According to the vendor, there is no need for the user to write, debug and document the code.

Labview is priced at $1,995.

National Instruments, 12109 Technology Blvd., Austin, Texas 78727.

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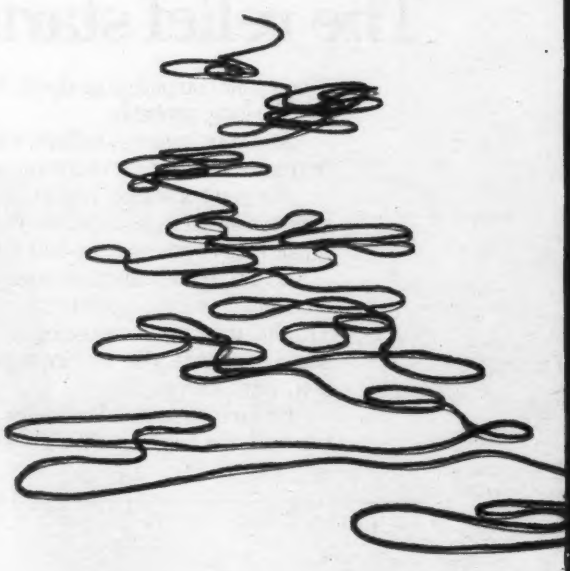

NEW PRODUCTS/MICROCOMPUTERS

Experteiligence has announced **Exper-Prolog II**, a Prolog interpreter for the Apple Computer, Inc. Macintosh.

Exper-Prolog II is said to include real numbers, string manipulations and advanced process control. According to the vendor, it allows the user to interactively load, execute, extend and modify Prolog programs.

The interpreter comes with a set of documentation, including a reference manual, a user manual and the Prolog II book written by F. Giannesini, M. Van Caneghem, H. Kanoui and R. Pasero.

Exper-Prolog II is priced at $495.

Expertelligence, 559 San Ysidro Road, Santa Barbara, Calif. 93108.

■

Backpac International Corp. has introduced **PSDOS 3.00**, a software product for use with the BP-100+ write-once optical disk drive system.

PSDOS 3.00 is a Microsoft Corp. device driver that allows the user to expand storage needs in increments of 115M bytes by adding additional optical drives as needed.

According to the vendor, the modular drives are fully user configurable to provide both high-speed access and efficient data transfer.

PSDOS 3.00 runs with IBM Personal Computer XTs, ATs and compatibles.

The PSDOS 3.00 costs $134.95.

Backpac International, 1701 Directors Blvd., Austin, Texas 78744.

■

Compuvision International has introduced **Total Printer**, a text and graphics utility that allows control of the features of Hewlett-Packard Co. Laserjet and Laserjet Plus printers linked to IBM Personal Computers, Personal Computer XTs, ATs or compatibles.

Total Printer can be used to control fonts, pitches, point sizes and italics. According to the vendor, some features of Total Printer include automatic envelope formatting, automatic counters for numbering pages or paragraphs and changeable output destinations to other communications, printer ports or files.

Total Printer costs $79 per copy.

Compuvision International, P.O. Box 1287, Old Chelsea Station, New York, N.Y. 10013.

■

International Microcomputer Software, Inc. has added **Turbo-Halo** and **IMSI Galleria** to its graphics software product line for use with IBM Personal Computers and compatibles.

Turbo-Halo is an IBM Enhanced Graphics Adapter-compatible tool kit. IMSI Galleria consists of three graphics libraries: the business library, the home library and the picture library. Each library enables users of graphics programs to pull up pictures, icons, borders and artists' drawings.

Turbo-Halo costs $99. Each IMSI Galleria library costs $29.95. Two libraries cost $49.95, and all three cost $59.95.

International Microcomputer Software, 633 Fifth Ave., San Rafael, Calif. 94901.

Software enhancements

Generic Software, Inc. has announced **Generic CADD Version 2.0**.

Generic CADD is a computer-aided design and drafting package. New features include increased speed, macros, plot spooling, feet and inches, polar coordinates and ortho mode. Added capabilities include rotate, rescale and global editing.

Generic Cadd costs $99.95.

Generic Software, 8763 148th Ave. N.E., Redmond, Wash. 98052.

■

Graham Software Corp. has announced **Version 1.3** of **Alice: The Personal Pascal**.

The enhanced version is said to be compatible with industry-standard Pascal compilers. It also supports Borland International, Inc.'s Turbo Pascal.

Other Version 1.3 enhancements include improved Help facilities and expanded automatic program formatting. File conversion capabilities have been added to handle the translation of

Continued on page 100

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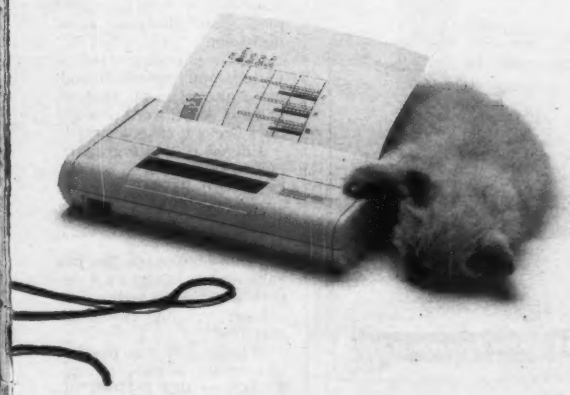

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Continued from page 99

Turbo Pascal programs that use Include File routines.

Alice: The Personal Pascal Version 1.3 is priced at $95.

Registered users of previous versions can upgrade for $19.95.

Graham Software, 212 King St. W., Toronto, Ont., Canada M5H 1K5.

■

Master Computer Systems, Inc. has announced **Formix Version 2**, an upgrade of its screen management system and software development environment for the IBM Personal Computer family and compatibles.

Formix is said to be language independent. Version 2 automates 45 additional screen functions in a panel-oriented environment. It features a memory-resident executive that executes 57 screen management functions and a menu-driven development environment.

Formix Version 2 is written in assembly language. It interfaces to most Microsoft Corp. MS-DOS compiler languages.

Development systems are available for $695 per copy.

Master Computer Systems, 9531 W. 78 St., Eden Prairie, Minn. 55344.

■

Locus Computing Corp. has released **Version 2.7** of its **PC-Interface** designed to enable users to share resources between systems running Unix 4.2 and Microsoft Corp.'s Xenix, as well as AT&T's Unix System V and those running under Microsoft's MS-DOS.

Release 2.7 features additional distributed processing functions that enable a user to begin a Unix process from within a DOS program. Another enhancement is the capability to run software packages such as Ashton-Tate's Dbase II and Multimate and Autodesk, Inc.'s Autocad.

The PC installation costs $250, and the Unix host installation costs $500.

Locus Computing, 3330 Ocean Park Blvd., Santa Monica, Calif. 90405.

■

Universal Intergraphix Corp. has announced **Version 3.5** of its **3-D Graphixx** computer-aided design and drafting system.

3-D Graphixx is said to be capable of three-dimensional modeling, production drafting and editing surface of rotations, incremental rotation, controlled distortion and multiple edit types on lines or primitives.

Features of Version 3.5 include real-time animation on all three axes, additional on-line Help, a Go-To feature, expanded line and geometric primitives, line and primitive bisectors, a color mapping feature and electronic documentation.

3-D Graphixx interfaces to various applications, including finite element analysis and any ASCII word processing system. It costs $3,995.

Universal Intergraphix, Suite 108, 2990 E. G St., Ontario, Calif. 91764.

■

Penton Software, Inc. has enhanced its **Statpro 2.0** statistical software package to support high-resolution graphics.

Statpro 2.0, which operates under Microsoft Corp. MS-DOS or IBM PC-DOS, offers statistical capabilities in areas such as descriptive statistics, regression and time series.

The enhanced software now supports the standard color graphics adapter, the

Continued on page 102

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2. THE UNIX WORLD.

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3. THE REMOTE TELECOM WORLD.

mode, compatible with virtually all ANSI *and* ASCII terminal protocols. Plus its own set of 64 programmable function key levels. And its own segment of dedicated display memory. Meanwhile, the competition's only got split screens. No contest there, either.

4. THE ELECTRONIC-MAIL WORLD.

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5. THE LOCAL AREA NETWORK WORLD.

adaptability of the Falco 500 means you no longer need several terminals doing just one thing at a time. Because it does six things on one terminal—half a dozen on another.

To start opening windows today on a more productive, multi-host world, contact your

6. THE ASCII WORLD OF SUPERMINIS AND MICROS.

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For the one nearest you, contact Falco Data Products, 1294 Hammerwood Avenue, Sunnyvale, CA 94089; (408) 745-7123. Toll-free (800) 835-8765.

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THE SPECTACULAR PRODUCTIVITY MACHINE.

NEW PRODUCTS/MICROCOMPUTERS

Continued from page 100

Hercules Computer Technology Co. high-resolution monochrome adapter and the IBM Enhanced Graphics Adapter. Statpro 2.0 also supports graphic printers such as those from IBM, Epson America, Inc. and Hewlett-Packard Co.

Statpro runs on the IBM Personal Computer, Personal Computer XT, PC AT and compatibles.

Statpro 2.0 costs $795.

Penton Software, Suite 2846, 420 Lexington Ave., New York, N.Y. 10017.

■

Management Graphics, Inc. has released an updated version of **Personal Business Slideware,** its personal computer-based software package.

The software is said to allow users to design and preview business graphics on IBM Personal Computers and compatibles and have them processed into high-resolution presentation 35mm slides or transparencies.

The menu-driven package includes black-and-white texturing, a tab chart function and text editing features.

Personal Business Slideware costs $595.

Management Graphics, 1401 E. 79th Street, Minneapolis, Minn. 55420.

■

Texasoft, Inc. has introduced **Version 3.0** of the **Thinker Electronic Spreadsheet** for the business and educational markets.

Version 3.0 has statistical, math and financial functions and includes spreadsheet files on disk. According to the vendor, the Thinker has the same command structure as Lotus Development Corp. 1-2-3.

Version 3.0 is IBM PC-DOS and Microsoft Corp. MS-DOS compatible and works with any printer on floppy or hard disks.

Version 3.0 costs $39.95.

Texasoft, P.O. Box 1169, Cedar Hill, Texas 75104.

■

McGraw-Hill CCIG Software has enhanced its program profiler, **X-View 86,** to run with with IBM PC-DOS and Microsoft Corp. MS-DOS Debug Version 3.0.

New features include a resident timer program to allow X-View 86 to execute system timer-dependent programs. According to the vendor, the program also helps improve program performance, get rid of unwanted side effects and expedite program conversion and porting. X-View 86 runs on IBM Personal Computers and compatibles.

X-View 86 costs $59.95.

McGraw-Hill CCIG Software, Suite 1350, 8111 LBJ Freeway, Dallas, Texas 75251.

■

McDonnell Douglas Professional Services Co. has announced **Prokit Analyst Release 2.0.**

The product is said to integrate a graphics package with a data dictionary, allowing users to interactively create and maintain data flow diagrams at the same time that they maintain a data dictionary.

Release 2.0 includes direct access to dictionary maintenance from the diagram editor, expansion of the import/export function, addition of an on-line report browse facility with split-screen capabiltiy, expanded support for multiple projects, pop-up windows with search capability and improved text processing functions.

Prokit Analyst runs on IBM Personal Computers and costs $2,450.

McDonnell Douglas, P.O. Box 516, St. Louis, Mo. 63166.

■

Open Systems, Inc. has announced **Resource Manager 3 with Windows** for its Open Systems Accounting Software (OSAS) Version 3 product line on 3Com, Inc.'s 3+ network.

The Resource Manager 3 with Windows automates installations and provides system utilities for OSAS applications. It features predefined inquiry windows.

The Microsoft Corp. MS-DOS and IBM PC-DOS versions cost from $795 to $1,895, depending on the number of users. The Microsoft Xenix version costs $395, and the AT&T 3B2 Unix V version costs $995.

Open Systems, 6477 City West Pkwy., Eden Prairie, Minn. 55344.

■

Campbell Services, Inc. has upgraded its **Reminder Time Management and Follow-Up System** for IBM Personal Computers.

The appointment and to-do scheduler system is said to support background-resident as well as stand-alone operation. Features include the ability to create daily appointment and to-do lists for user-selected categories, prioritize tasks in any category, carry incomplete tasks over to the next day and sound a reminder alarm up to four hours before an appointment.

Reminder costs $99.

Campbell Services, Suite 1070, 21700 Northwestern Highway, Southfield, Mich. 48075.

■

Microphonics Technology Corp. has enhanced its **Stylewriter** print manager.

Enhanced features of Stylewriter include an expanded print buffer, expanded type style selection and bar-code printing capabilities.

According to the vendor, Stylewriter upgrades standard dot matrix

Continued on page 106

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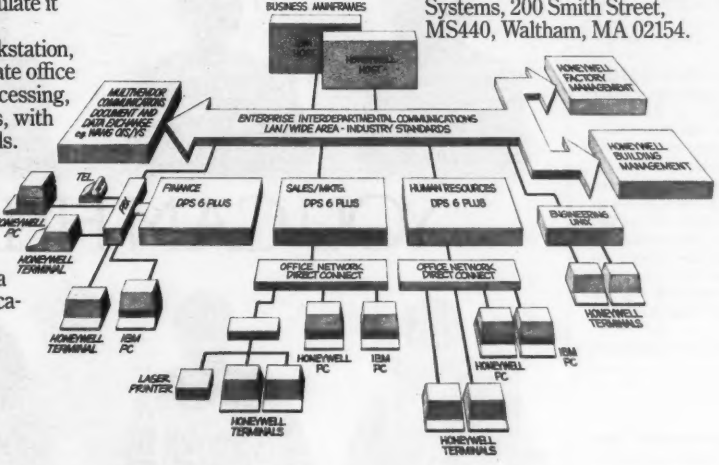

Together, we can find the answers.

Honeywell

Continued from page 102

print to actual or near letter quality.

Stylewriter works with computers offering a parallel port and most parallel dot matrix printers.

Stylewriter costs $229.

Microphonics Technology, Suite B, 25 37th St. N.E., Auburn, Wash. 98002.

Communications

Wordtech Systems, Inc. has announced a local-area network version of its **Networker** file server module for Ashton-Tate's Dbase III.

Networker is said to control records and file locking of Dbase III Plus data. It was designed for use with Wordtech's Dbase III Compiler for the Dbase III programming language.

According to the vendor, only one Networker is required per file server on a local-area network. It features a transparent mode that allows automatic record addition and file locking to a Dbase III application.

Networker costs $99.

Wordtech Systems, P.O. Box 1747, Orinda, Calif. 94563.

■

Gammalink has introduced an upgraded version of its **Gammafax** communications product.

Gammafax consists of a single adapter card plus menu-driven software. It is said to provide IBM Personal Computers, Personal Computer XTs, ATs and compatibles with the ability to communicate with Group III facsimile machines over dial-up lines worldwide.

According to the vendor, with Gammafax installed, the PC emulates a facsimile machine, becoming part of the facsimile network.

Gammafax costs $995.

Gammalink, 2452 Embarcadero Way, Palo Alto, Calif. 94303.

■

Pick Systems has released **Mainlink**, a software package that allows bidirectional transfer of data between IBM Personal Computer ATs and XTs and larger systems based on the Pick operating system.

Mainlink is said to move items, files or accounts from one system to another at speeds of up to 3M bit/hr. Mainlink also offers advanced communications capabilities when installed on two or more PCs.

Mainlink is priced at $295 for the Personal Computer XT and $395 for the PC AT.

Pick Systems, 1691 Browning, Irvine, Calif. 92714.

■

McDonnell Douglas Applied Communications Systems Co. has introduced **Filexchange**, software said to transfer personal computer files among dispersed offices.

Using a modem or hard-wire connection to the Tymnet network, Filexchange users send personal computer files to a store-and-forward host. Filexchange uses the X.PC communications session protocol to detect and correct transmission errors.

Filexchange operates with IBM Personal Computers and compatibles. A monthly subscription fee is $300 per account. The PC software is $99 per copy, and file transfer charges are 25 cents per kilocharacter during prime time or 13 cents per kilocharacter during non-prime time.

McDonnell Douglas, 20705 Valley Green Drive, Cupertino, Calif. 95014.

Data storage

Innovative Software Systems has announced **Revision 2.5** of its **PCLIF** utility software package and the **FDD35** microfloppy disk drive system for the IBM Personal Computer family.

According to the vendor, users of PCLIF and FDD35 can bidirectionally transfer files between IBM PCs and Hewlett-Packard Co. technical computers through the exchange of 3½-in. or 5¼-in. floppy disks.

PCLIF costs $495 and FDD35 $795.

Innovative Software Systems, Suite 122, 1611-D Crenshaw Blvd., Torrance, Calif. 90509.

■

Syquest Technology has announced the **SQ319 kit**, a hardware and software package said to enable users to integrate removable hard disk drives with IBM and IBM-compatible personal computers.

The kit features a 5¼-in. half-height Syquest 15M-byte removable hard disk drive. It includes an enhanced controller, utility software and installation and connecting hardware.

According to the vendor, all Syquest removable hard disk drives provide data security and transportability.

The SQ319 kit is prices at $1,395.

Syquest Technology, 47923 Warm Springs Blvd., Fremont, Calif. 94539.

Toshiba America, Inc. has announced the **PC Floppy Link**, a storage option for its T1100 portable personal computer.

The PC Floppy Link allows the floppy drive in an IBM Personal Computer or Personal Computer XT to be used as an external floppy disk drive for the T1100.

According to the vendor, a switch on the T1100 allows users to designate the T1100's internal drive as drive A and the PC's drive as drive B, or vice versa.

The PC Floppy Link consists of a peripheral card and cable that fit inside the personal computer and an external cable that connects it to the T1100.

The PC Floppy Link is priced at $99.

Toshiba America, 2441 Michelle Drive, Tustin, Calif. 92680.

NEW PRODUCTS/MICROCOMPUTERS

Proapp, Inc. has announced the **Proapp 10** and the **Proapp 20**, 10M-byte and 20M-byte hard disk subsystems said to be interchangable between the Apple Computer, Inc. Apple II and Macintosh computers.

The subsystems are composed of a drive, a controller and port circuits and attach to the floppy disk ports or the small computer systems interface ports of the computers.

According to the vendor, users can partition the disks to accommodate different operating systems. The subsystems are also said to include a printer and spooler interface that is compatible with the Apple Image Writer.

The Proapp 10 subsystem is priced at $795, and the Proapp 20 is priced at $995.

Proapp, 1475 S. Bascom Ave., Campbell, Calif. 95508.

Express Systems, Inc. has announced the **Express Hard Diskcards**, a series of hard disk cards ranging in capacity from 20M to 60M bytes.

Each card comes complete with software, cables and instructions. Average access speeds vary from 60 msec to 80 msec at 5M to 7.5M bit/sec. transfer rates. All 60-msec average access speed drives come with automatic head retraction.

The Express Hard Diskcards are compatible with IBM Personal Computers and compatibles. According to the vendor, the 40M- and 60M-byte cards require two slots; all others require 1½ slots.

Prices range from $449 for the 20M-byte AT Backup Diskcard to $1,095 for the 60M-byte card.

Express Systems, 1254 Remington Road, Schaumburg, Ill. 60195.

Fastore has introduced its **Solidisk/Li**, a solid-state, nonvolatile mass storage system for use with IBM Personal Computers and compatibles.

Solidisk/Li utilizes ultralow power static random- access memories to provide 96K bytes of read/write storage.

Solidisk/Li also uses 256K bytes of erasable programmable read-only memory (EPROM) to provide 384K bytes of read-only memory.

According to the vendor, Solidisk/Li is said to combine an on-board EPROM programmer with high-speed programming algorithms.

Solidisk/Li storage system is priced at $950. According to the vendor, it is available immediately in prototype quantities.

Fastore, 134 Old Ridgefield Road, Wilton, Conn. 06897.

Printers/Plotters/Peripherals

Compuscan, Inc. has announced a **Honeywell Word Processor Interface** for its desktop PCS page reader.

The page reader scans type text and transmits the information to word processors such as the Honeywell, Inc. DPS 6 and IBM-compatible personal computers. It reads approximately 120 pages per hour, according to the vendor, and documents can be stacked up to 50 sheets at a time.

The PCS page reader with a Honeywell interface costs $6,495.

Compuscan, Building 2, 81 Two Bridges Road, Fairfield, N.J. 07006.

■

Sharp Electronics Corp. has announced the **CE-700P** transfer printer, said to print directly onto overhead projector transparencies.

The CE-700P prints in either text or a 480 dot/in. graphics mode. In text mode, courier and elite fonts are standard. The printer was designed for use with Sharp's PC-7000 IBM-compatible personal computer. It also works with any standard parallel printer port.

The CE-700P costs $399.

Sharp Electronics, Sharp Plaza, Mahwah, N.J. 07430.

COMMUNICATIONS

Voice/data communications

Octel Communications Corp. has announced **Newscomm**, a voice processing communication system for large newspapers.

Newscomm is said to provide a range of applications, such as fast and accurate routing of messages, by providing a customer service representative to answer calls and then delivering those calls as recorded messages to an appropriate mailbox.

Newscomm prices start at $45,000.

Octel Communications, 890 Tasman Drive, Milpitas, Calif. 95035.

■

Innovative Technology, Inc. has unveiled **Nitareceptionist**, a telephone reception and messaging system.

Nitareceptionist is a software program that works in conjunction with the vendor's Nita plug-in board for the IBM Personal Computer and compatibles. The system is said to be capable of automtic call answering and routing, call screening and message recording. It can operate in the background while the personal computer is running other applications.

A four-line system costs $2,595. Line-expansion modules cost $1,995.

Innovative Technology, Suite 422, 1000 Holcomb Woods Pkwy., Roswell, Ga. 30076.

■

Equatorial Communications Co. has added the **C-250** micro earth station for remote locations with critical response time or large-block transmission requirements to its Equastar satellite transaction network.

The C-250 is said to be capable of sending data at 9.6K bit/sec. and receiving up to 19.2K bit/sec. of information from a shared 150K bit/sec.

Continued on page 108

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satellite channel.

Other additions to Equastar include expanded network facilities such as a third 11-meter antenna and 2.5 million amperes of uninterruptible power and supplementary master earth station backup capacity.

The C-250 is priced at $8,000 in quantities of 500 or more.

Equatorial Communications, 189 N. Bernardo Ave., Mountain View, Calif. 94043.

Quality Software, Inc. has announced **QS Call Version 3.0**, an update of its asynchronous telecommunications package.

Added features include an automatic installation procedure, parameters for a phone-entry system, 40 user-definable function keys and Help screens. QS Call supports data transfer rates from 110 to 9.6K bit/sec. and Transmitter On and Transmitter Off protocols.

QS Call offers dumb terminal emulation and Hayes Microcomputer Products, Inc.-compatible modem support. Also, the user's manual has been expanded.

QS Call runs on IBM Personal Computers and compatibles. It costs $150.

Quality Software, 60 Lewis St., Newton, Mass. 02158.

■

Ilex Systems, Inc. has announced the **PC 9624** voice digitizer printed-circuit card, designed for real-time transmission of digital voice from an IBM Personal Computer or compatible.

The card fits into one PC expansion slot. It provides four modes of operation: voice-only transmission, data-over-voice transmission, data-only transmission and facsimile transmission.

All output is via the synchronous port on the card. The audio input to the voice digitizer is via a telephone handset or an optional operator headset.

The operation is controlled by an Ilex software package. Digital output is under PC bus control.

The PC 9624 costs $3,950.

Ilex Systems, 1423 S. Milpitas Blvd., Milpitas, Calif. 95035.

Protocol converters

Dynatech Corp.'s **ISDP** division has announced the **Delta Probe 1**, an Integrated Services Digital Network (ISDN) interface emulator.

The Delta Probe 1 was designed to generate the physical characteristics of the ISDN basic rate interface. It features five predetermined CCITT-compatible frame patterns and one user-definable pattern. It checks the interface at the CCITT's reference point in both directions.

The Delta Probe 1 is priced at $495.

Dynatech ISDP, 5419 D Backlick Road, Springfield, Va. 22151.

■

The Industrial Products Division of Industrial Electronic Engineers, Inc. has introduced the **Universal Serial Data Converter Module with Memory** (USDCM/M).

The unit is said to provide serial-to-parallel data conversion with RS-232C, RS-422A or 20 mA current loop input levels. Up to 127 messages, totaling 16,000 characters and commands, are stored in battery-backed random-access memory and can be sent to displays. Two separate displays can be addressed individually or simultaneously.

The USDCM/M features selectable data rates up to 9.6K bit/sec. Up to 127 units can be controlled by one host output port.

The unit costs $152.

Industrial Electronic Engineers, 7740 Lemona Ave., Van Nuys, Calif. 91405.

■

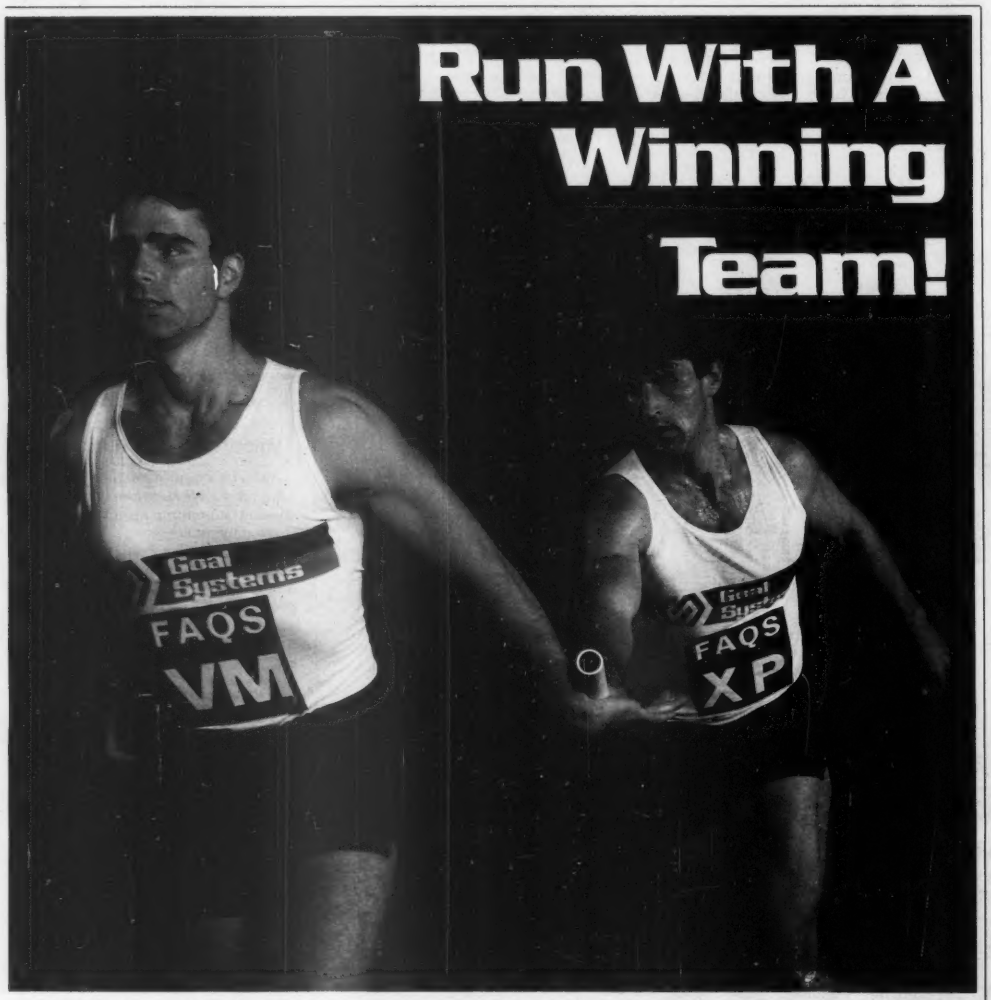
Avatar Technologies, Inc. has introduced the Avatar **DC202 Coax Baluns**, said to allow modular telephone cable or twisted-pair wiring to be used for transmitting data of IBM 3270-type devices at distances up to 1,200 ft.

According to the vendor, the baluns take the coaxial signal from an IBM 3274 or 3276 controller and transmit it to the peripherals over modular telephone cable or twisted-pair wire.

On the peripheral end, the coaxial baluns take the input and change it back to coaxial.

Each unit has two I/O connectors, a male BNC connector attached to a 10-in. piece of coaxial and an RJ11 connector. According to the vendor, they cost $80 per pair.

Avatar Technologies, 99 South St., Hopkington, Mass. 01748.



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EMC is the only manufacturer of add-in memory to offer you an *unconditional lifetime warranty.*

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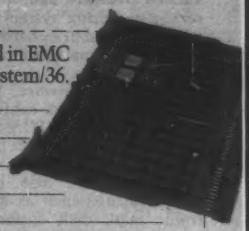

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Software

Tymnet, Inc. has introduced **Smartym 3270**, a communications software package for the IBM Personal Computer and compatible systems for use with Tymnet's Asynchronous-to-3270 protocol conversion service.

Smartym 3270 is said to enable a PC to access 3270 host applications without the need for synchronous emulator boards, protocol converters or host-based conversion software.

The package features soft keys and capture-to-disk.

Smartym 3270 costs $175.

Tymnet, 2710 Orchard Pkwy., San Jose, Calif. 95134.

■

Fischer-Innis Systems Corp. has announced **Release 2.6** of its **Emc2** electronic mail communication center system.

Emc2 operates in IBM mainframe environments including MVS, TSO, VSE, VM, CICS, IMS and Distributed Office Support System. It also offers networking among multiple CPUs and integrated personal computer file support.

The new release allows users of CICS and IMS to automatically log on to Emc2. Other features include the ability to broadcast a message to all users and enhanced personal computer support capabilities.

MVS and CMS versions lease for $800 per month, and the VSE version leases for $600 a month. Purchase prices start at $18,000 for MVS and CMS versions and $14,000 for the VSE version.

Fischer-Innis Systems, 4175 Merchantile Ave., Naples, Fla. 33942.

■

Gateway Communications, Inc. has enhanced **Advanced Netware 286**, a file server operating system for its G/Net local-area network for IBM Personal Computers and compatibles.

Advanced Netware 286 supports a network configuration of up to 100 PC workstations and up to 32 file/print servers.

The software also provides features such as electronic mail, disk optimization, systems security and file and record locking.

Advanced Netware costs $2,095 for a two-node hardware and software kit.

Gateway Communications, 16782 Red Hill Ave., Irvine, Calif. 92714.

Multiplexers/Modems

Racal-Milgo has introduced three fiber-optic multiplexers, **Omnimux 1400 T-1**, **Omnimux 8100** and **Omnimux 8600**, and two fiber-optic modems, **Fibermode 1100 T-1** and **Fibermode 6100.**

According to the vendor, the Omnimux fiber products provide wideband communications for the single-building or campus-like networking environment. They are said to feature high data throughput at low error rates.

Fibermode modems are compatible with Racal-Milgo Omnimux 82, 162 and 322 statistical multiplexers and can be incorporated into existing analog networks.

The Omnimux fiber products are priced from $1,200 to $3,080; the Fibermode products cost from $176 to $1,200.

Racal-Milgo, P.O. Box 407044, Fort Lauderdale, Fla. 33340.

■

Pilkington Communication Systems, Inc. has announced **1904**, a four-port, fiber-optic time division multiplexer.

The 1904 is said to feature a triple-channel expansion mode that can be independently expanded to three asynchronous channels without control signals, giving the user a total of 12 channels. It operates each channel at up to 64K bit/sec.

The 1904 uses the RS-232C standard interface and optional V.35 and RS-442 interfaces.

The cost of 1904 is $895.

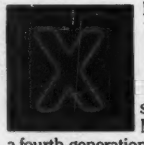
Pilkington Communication Systems, 65 Moreland Road, Simi Valley, Calif. 93065.

When you need a system the sum of its parts: Count

To maximize the availability of your data communications network today—especially multinode T1 networks—you need a system that's even greater than the sum of its parts. At GDC, we know it's not just one part, but every part working together that makes your network a success.

Putting that knowledge to practical use has made GDC the leader in megabit multiplexing, with the largest installed base of private T1 networking products. We have maintained our leadership position with MEGANET, the ultimate service for cost-effective networking and control. It's the only solution that adds products plus services to equal a total networking system. A system that offers the broadest, most compatible line of products with built-in flexibility that work together to fit your particular communications requirements; from sophisticated multiplexed or switched multi-node T1 networks, to simple local area access.

Even more importantly, MEGANET includes comprehensive service and support with extensive people management capabilities for installation and training. With MEGANET, it all adds up to a total networking solution you can count on.



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GDC's software-based MEGAMUX® II, a fourth-generation multiplexer, multiplies your multi-node T1 networking like never before.

It represents 10 years of GDC leadership in T1 multiplexing. It accommodates up to 16 aggregate links, with aggregate rates up to 2,048 Mbps. It includes an autoframe feature to maximize efficiency of bandwidth allocation in multiple node, multiple aggregate networks. It uses the same data and voice channel cards as GDC's MEGAMUX® PLUS and KILOMUX™ PLUS multiplexers to provide flexible, compatible and cost-effective configuration. And it incorporates redundancy and diversity switching to ensure reliability, with preprogrammed alternate routing in case of line failure.

With three types of voice channels, plus centralized control and management via GDC's NETCON® Network Management System, MEGAMUX II is the next step to higher level networking.

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A truly flexible communications system extends the reach of your network in every direction, including the latest technological developments in packet switching.

With our GEN*NET® family of concentrators, and our GEN* PAC X.25 PAD access devices, you have your own link to a packet-switched network. For high-speed, high-density applications, they offer the most economical, reliable way to connect geographically dispersed computers and terminals.

Eliminate network errors with greater accuracy and reliability.

It's a fact that 75% of the major telecommunications carriers in North America have standardized on GDC datasets for internal use and resale. Why? Because our analog, digital and down line programmable datasets offer greater performance, reliability and cost-effectiveness. They give you the broadest selection available for switched and private line networks. And they incorporate many features to help eliminate costly and time-consuming errors.

In addition, they include GDC's exclusive DataCommonality modular packaging to reduce spares and simplify operation and maintenance. The same plug-in circuit card can be used for both stand-alone and rack-mount units; front only access provides for ease of installation, quick changes and adjustments. And you can upgrade efficiently and cost-effectively within a limited network area, easily moving from lower to higher data speeds or from dial-up—switched network—to leased line operations.

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SYSTEMS & PERIPHERALS

Processors

Comark Corp. has introduced the **MV30/35** enhanced Intel Corp. Multibus processor.

The MV30/35 is a single board featuring the NEC Corp. V30 series processor, 1M byte of dual port parity random-access memory, sockets for an Intel 8087 FPP, 8089 direct memory access controller and four 28-pin erasable programmable read-only memories.

Other features include three independent counter timers, a programmable interrupt controller, programmable read-only memory disable and 4-bit page registers, according to the vendor.

The MV30/35 is software compatible with Intel's ISBC 8630 and ISBC 8635. It is reportedly available with the Concurrent DOS system and operates at 10 MHz.

The MV30/35 costs $1,095.

Comark, P.O. Box 474, 93 West St., Medfield, Mass. 02052.

■

Recognition Technology, Inc. has announced the **RTI-400** series of Motorola, Inc. VMEbus-compatible boards.

The series includes the PX-401V intelligent pixel processor, the AS-401V analog subsystem for video inputs and video outputs and two image memory boards, the DS-401V and the DS-441V. Together the boards are said to form a complete vision engine subsystem.

Software support is provided by RTILIB/400, a real-time image processing/machine vision subroutine package with C-callable routines covering image enhancement, segmentation, feature extraction and more.

The AS-401V costs $2,995; the PX-401V costs $3,495; the DS-401V costs $2,495; the DS-441V is priced at $3,495; and the RTILIB/400 costs $1,500.

Recognitions Technology, 335 Fiske St., Holliston, Mass. 01746.

■

Motorola Semiconductor Products, Inc. has introduced the **Model MVME133** 32-bit VMEbus-compatible microcomputer board.

The board is said to incorporate a 12.5-MHz 68020 MPU with a companion floating-point math coprocessor plus a 1M-byte dynamic random-access memory array. It features a serial debug and two RS-232C multiprotocol serial I/O ports, three 8-bit timers, a real-time clock and a VMEbus master interface with system controller capabilities.

The MVME133 board is priced at $1,995. A 16.67-MHz version of the board is available.

Motorola Semiconductor Products, P.O. Box 20912, Phoenix, Ariz. 85036.

■

Force Computers, Inc. has announced the **CPU-6** series of Motorola, Inc. VMEbus CPU boards, said to support fast floating-point operations and multiprocessing applications.

The series incorporates Motorola 68000 or 68010 processors and offers 512K bytes of dedicated on-board dynamic random-access memory, permitting zero-wait-state operation at 8 MHz and one-wait-state operation at 12.5 MHz.

According to the vendor, features include four 28-pin erasable programmable read-only memory sockets, three RS-232C serial ports, one parallel port and a real-time clock with battery backup.

The CPU-6 is priced at $1,845.

Force Computers, 727 University Ave., Los Gatos, Calif. 95030.

■

Force Computers, Inc. has introduced **Miniforce-2P21**, a 32-bit multiuser hardware and software development system.

The Miniforce-2P21 provides a Motorola, Inc. VMEbus-based open-system architecture. According to the vendor, the system runs at 16.7-MHz without wait states and features the PDOS real-time operating system.

Key features of the system include a 51M-byte Winchester disk, a 1M-byte floppy disk and two RS-232 serial ports. Miniforce-2P21 works with the Motorola 68020 CPU and the 68881 floating-point coprocessor.

The Miniforce-2P21 is

Continued on page 112

that's even greater than on General DataComm.

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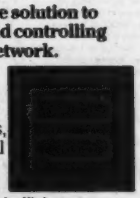

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NETCON gives you unsurpassed multi-level control over a wide range of facilities; digital network architectures, multiplexing systems, data sets, and local area networks. It provides comprehensive, sophisticated network management from a single centralized operating center. It assures total network availability with continuous surveillance; instant alarm, restoral and management reporting; and unparalleled diagnostic testing and control. And it provides inbound diagnostics and pre-equalization by individual drop on multi-point services.

Designed for maximum flexibility and total service, NETCON helps you meet the challenges of ever-changing applications and requirements while assuring total network availability. And its compatibility allows integration without obsoleting existing equipment.

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Our systems are solutions.

NEW PRODUCTS/SYSTEMS & PERIPHERALS

Continued from page 111

priced at $15,990.

Force Computers, 727 University Ave., Los Gatos, Calif. 95030.

■

Southern Data Systems, Inc. has introduced the **DM8 2MB** memory board for the Wang Laboratories, Inc. 2200 series of processors.

The DM8 memory board provides up to 1M byte of internal data memory and a minimum of 1M byte of Southern Data Systems' random-access memory disk, depending on the data memory requirements, all on a single board.

According to the vendor, the 1M byte of data memory will support up to 16 terminal partitions of 16K bytes each.

The DM8 2MB memory board is priced at $3,600.

Southern Data Systems, 5115 Holly Ridge Drive, Raleigh, N.C. 27512.

■

GMX, Inc. has announced the **Micro-20 SBC** add-in board.

The board combines a 12.5-MHz or 16.67-MHz Motorola, Inc. 68020 32-bit microprocessor and an optional 68881 floating-point coprocessor with 2M bytes of 32-bit wide random-access memory, up to 256K bytes of 32-bit wide erasable programmable read-only memory, four serial ports, an 8-bit parallel port, a 5¼-in. floppy disk controller and a real-time clock with battery backup. A 16-bit expansion connector allows the addition of off-the-shelf or custom I/O interfaces.

The board is priced at $2,750 including a GMX version of Motorola's 020 Bug monitor/debugger and a set of hardware diagnostics.

GMX, 1337 W. 37th Place, Chicago, Ill. 60609.

■

Clearpoint, Inc. has announced the **RTRAM** series of add-in memories for the IBM RT Personal Computer RT.

The RTRAM/4 offers 4M bytes of memory, and the RTRAM/8 offers 8M bytes of memory. Both boards allow users to configure up to 16M bytes for the full address space of the RT PC.

Both boards are IBM-compatible and support the RT PC error detection and correction logic.

The RTRAM/4 is priced at $1,895 and the RTRAM/8 costs $4,395.

Clearpoint, 99 South St., Hopkinton, Mass. 01748.

■

CIE Systems, Inc. has introduced the **Turbo CPU** upgrade module for its Motorola, Inc. 68000-based multiuser business systems.

The module is available for midrange members of the CIES 680 family running either Pick Systems' Pick or RM/COS operating systems.

Two versions are available: the Turbo CPU with 256K bytes of onboard memory and the Turbo-Plus CPU with 1M byte of on-board memory. Both can address up to 8M bytes of system memory. They are based on the 32-bit Motorola 68020 CPU running at 16.7 MHz.

The Turbo CPU costs $4,995, and the Turbo-Plus CPU costs $8,395.

CIE Systems, 2515 McCabe Way, Irvine, Calif. 92714.

■

Plexus Computers, Inc. has introduced add-on **Advanced Communications Processor** (ACP) boards said to double the capacity of its P/35 and P/60 Unix-based computer systems.

According to the vendor, the P/60 can be expanded by up to 80 users with the addition of five ACP boards, and the P/35 can be expanded to 32 users with two ACP boards.

The boards are front-end processors that remove the I/O functions from the main job processor's workload. Each has 16 serial ports and one parallel printer port and can support Systems Network Architecture, Bisynchronous, X.25 and Defense Data Network protocols.

Each ACP board costs $6,000.

Plexus Computers, 3833 N. First St., San Jose, Calif. 95134.

Graphics systems

P. Nikola Co. has introduced the **RG02**, an intelligent graphics controller.

The RG02 is said to change vector graphics into a matrix understood by laser matrix printers. It is a single Euro-format card fitted with an RS-232 or RS-422 serial interface as well as a Centronics Data Computer Corp. parallel interface.

Features include erasable programmable read-only memory software, a mini calculator and a data buffer with a capacity of 512K bytes, expandable to 10M bytes. According to the vendor, the RG02 can reproduce all vectors.

The RG02 is priced at $1,495.

P. Nikola Co., Benzstr. 12, D-7050 Waiblingen, West Germany.

■

Management Graphics, Inc. (MGI) has enhanced the **Videotrace scanning system**, an optional attachment for Management Graphics' tabletop slide-making systems and workstations.

The Videotrace system is said to enable the operator on any Management Graphics system or workstation color monitor to view images such as technical schematics, line drawings, logos and medical graphs. The Videotrace scanning system incorporates an 850-line resolution.

The cost of the Videotrace scanning system is $4,495.

Management Graphics, 1401 E. 79th St., Minneapolis, Minn. 55420.

■

Palantir Corp. has introduced **Palantir Compound Document Processor** (CDP), a system said to read typeset or typewritten text without being manually trained.

Features of the Palantir CDP in-

Continued on page 115

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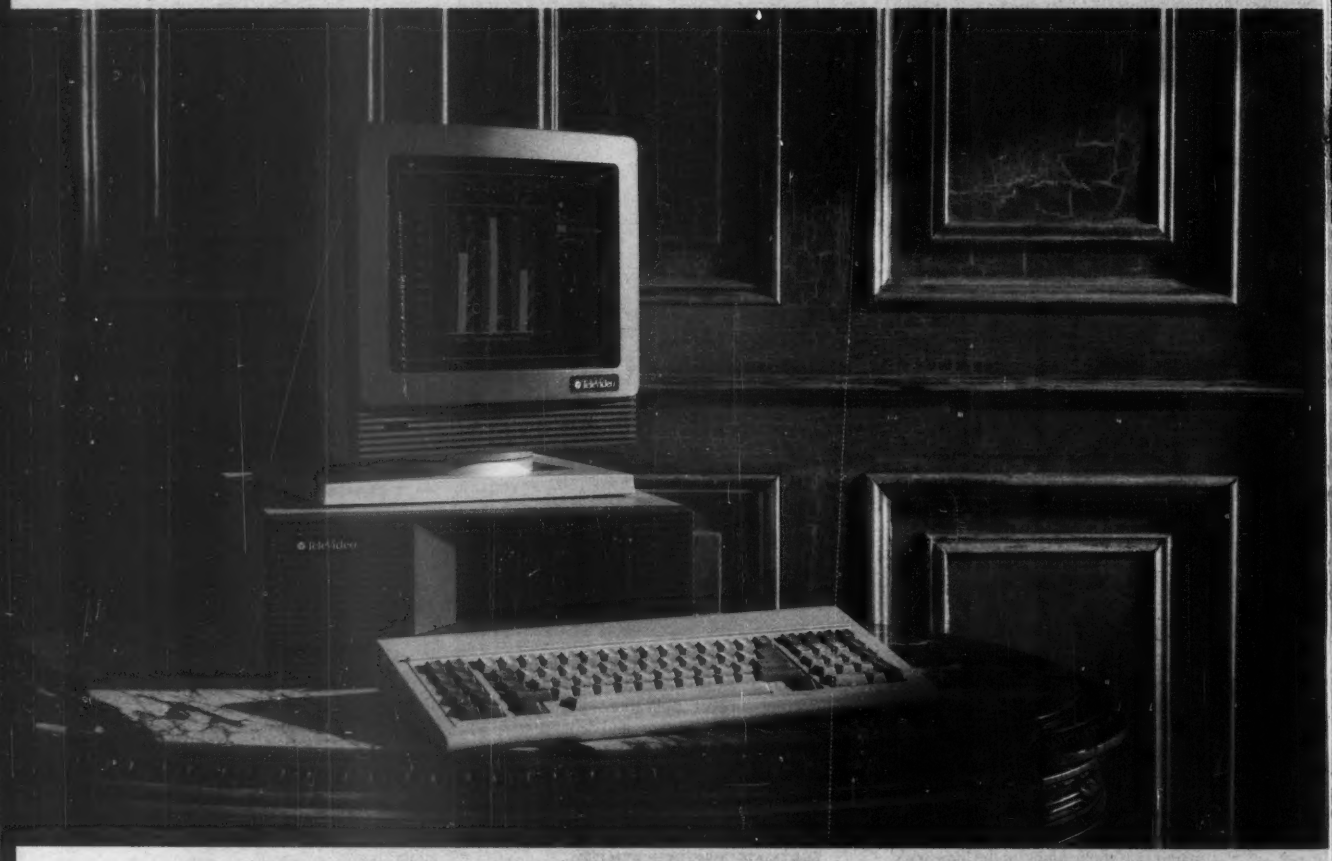

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Continued from page 112

clude page processing that permits all the information to be extracted from documents with multiple columns, embedded text and graphics and form processing.

Typically, the CDP works as part of a larger system that includes a host computer, display device, mass storage and printer.

The suggested price of a single end-user system is $39,500.

Palantir, 2500 Augustine Drive, Santa Clara, Calif. 95054.

■

Sony Corp. of America has announced the **VPH-1030Q1** and **VPH-2030Q1** multiscan projection systems.

The VPH-1030Q1 is said to project a picture measuring 100 in. diagonally. The VPH-2030Q1 projects a picture measuring 200 in. diagonally.

Using red-green-blue (RGB) inputs, the horizontal resolution is more than 900 TV lines at the center of the screen. Character display capacity of 4,000 char. can be achieved. In composite video, horizontal resolution is more than 520 lines.

Other features include two RGB inputs with independent horizontal shift controls, built-in speakers, video output connectors and remote control capability.

The VPH-1030Q1 costs $8,666, and the VPH-2030Q1 costs $8,888.

Sony, 9 W. 57th St., New York, N.Y. 10019.

■

Pericom, Inc. has added the **MX6000** and the **MX8000** color graphics terminals to its Monterey graphics family.

The MX6000 is said to be the functional equivalent of Tektronix, Inc.'s 4109. It features a 19-in. screen and 640- by 480-pixel resolution. According to the vendor, it is noninterlaced and runs at 60Hz. It allows 16 simultaneous, user-definable colors.

The MX8000 adds a 1,024- by 1,024-pixel resolution to all of the features of the MX6000.

The price for the MX6000 color graphics terminal is $6,995, and the price for the MX8000 is $8,995, according to the vendor.

Pericom, Suite 250, 111 Sepulveda Blvd., Manhattan Beach, Calif. 90266.

■

JDL, Inc. has announced the **GL Processor**, a graphics protocol converter said to provide Hewlett-Packard Co. 7475A plotter emulation for the vendor's color matrix printers and plotters.

The GL Processor is said to convert computer-generated, vector-based graphics data in the HP graphics language format into the raster format that is used by JDL.

According to the vendor, the GL Processor also operates as a print spooler for word processing and data processing.

The Model 15 is priced at $1,290 and can produce A-size color and monochrome, B-size two-color as well as C-size monochrome prints.

The Model 30 is priced at $1,690 and can produce A- and B-size four-color and monochrome and C-size two-color prints.

JDL, Suite 104, 2801 Townsgate Road, Westlake Village, Calif. 91361.

Printers/Plotters

Infoscribe, Inc. has enhanced its **Model 1100** printer.

The printer now features standard friction feed in addition to tractor feed, with manual feed of cut-sheet paper or single and dual tray automatic sheet feed using the AS-250 bottom-feeding automatic sheet feeder.

The Model 1100 provides 200 char./sec. data processing-quality printing, 100 char./sec. correspondence-quality printing and 40 char./sec. near-letter-quality printing. It also offers 72 by 72 dot/in. dot-addressable graphics, multiple type fonts and bar code printing options.

The Model 1100 is priced at $1,767.

Infoscribe, 1808 Michael Faraday Court, Reston, Va. 22090.

Western Automation Laboratories, Inc. has announced the **Seleris**, an intelligent plot spooler designed to work with computer-aided design systems.

The Seleris is said to attach to computers via an RS-232 serial communications port. It is available in .5M-byte, 1M-byte and 2M-byte sizes. Each comes with its own power supply.

The Seleris plot spooler stores multiple plots and allows the user to selectively delete any or all of the plots. According to the vendor, other features include the ability to interrupt or abort a plot in progress and the ability to make multiple copies of a selected drawing.

Prices for the three models are $495, $795 and $1,295.

Western Automation, 1700 N. 55th St., Boulder, Colo. 80301.

Kel, Inc. has announced the **Model 5311 laser page printer**.

The Model 5311 is said to offer a 20 page/min printing speed and 300 dot/in. resolution. It incorporates a Motorola, Inc. 68000-based controller, a laser engine and an amorphous silicon drum.

It accepts legal, letter and ledger-size paper. Paper handling options include a 2,000-sheet capacity paper deck, a dual face-down stacker with offset capability and a duplex print module for two-sided printing.

According to the vendor, standard communications capabilities include RS-232 serial and Centronics Data Computer Corp. parallel I/O interfaces.

Prices for the 5311 laser page printer start at $17,800.

Kel, 400 W. Cummings Park, Woburn, Mass. 01801.

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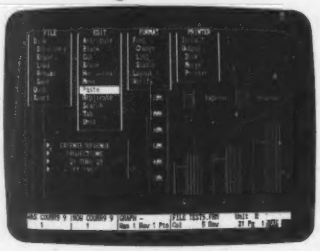

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Versatec, Inc. has announced the **Model 820 Raster Processing Machine**.

The unit is a 32-bit single microprocessor-based rasterizer designed for use with a Versatec electrostatic plotter, computer interface and host software.

It comes standard with 4M bytes of dual-ported memory. Main memory can be expanded to include either 8M or 12M bytes of dual-ported memory.

An optional 140M-byte hard disk can also be included in the system.

According to the vendor, the Model 820 can be upgraded to include two additional graphic processors, a bit-slice processor and a very large-scale interface processor.

The Model 820 Raster Processing Machine costs $12,000.

Versatec, 2710 Walsh Ave., Santa Clara, Calif. 95051.

■

Management Graphics, Inc., has added a **black-and-white laser printer** to its product line.

The laser printer output includes A4 and B5 international size copies and overhead transparencies, all at 300 dot/in. resolution.

According to the vendor, after the first copy is produced in 90 seconds, remaining copies are produced at up to eight page/min.

The laser printer is said to produce proof and handout copies of images created on the vendor's TTS/Tri-Master computerized slide-making system.

The laser printer comes with user-replaceable cartridges.

The Management Graphics laser printer costs $14,900.

Management Graphics, 1401 E. 79th St., Minneapolis, Minn. 55420.

Power supplies

Interactive Technologies, Inc. has introduced a computer-controlled **power supply** said to deliver variable regulated ouputs up to 20.47 VDC.

Along with the variable outputs, the power supply is said to deliver independent fixed +5VDC and ±12VDC outputs.

It features an IEEE 488 interface bus. Output and ground connections are binding posts or banana jacks on the panel front or a 12-pin connector on the back.

According to the vendor, the unit's memory recalls stored voltage settings.

The power supply is priced at $1,395.

Interactive Technologies, 2266 N. Second St., North St. Paul, Minn. 55109.

■

Modular Power Corp. has introduced **Upstar**, a series of electronic motor generators ranging from 15 KVA to 480 KVA.

Upstar is said to be able to protect mini and mainframe computer installations from outages and incoming utility power fluctuations. It enables the customer to add power protection as the load increases.

It features a design that includes large-scale integrated circuits, internal redundancy and a Help facility.

Upstar is priced from $30,000.

Modular Power, 1150 Ringwood Court, San Jose, Calif. 95131.

Elgin Electronics, a subsidiary of **Combustion Engineering,** has introduced the **FCP25/48FE** power supply.

The FCP25/48FE is a packaged power unit designed for private automatic exchange and private branch exchange as well as private automatic branch exchange telephone switches in which batteries are not required.

According to Elgin Electronics, the unit has a 25A capacity and a 48-volt DC power supply.

FCP25/48FE power supply is regulated and filtered.

The FCP25/48FE unit reportedly operates on 60 Hz single-phase AC voltage.

The FCP25/48FE is priced at $1,160.

Elgin Electronics, 5533 New Perry Highway, Erie, Pa. 16509.

Auxiliary equipment

Itran Corp. has introduced its **Vision Statistical Processor** (VSP), designed for use with Itran machine vision inspection equipment.

The VSP is said to perform statistical process control for ensuring quality control during the manufacturing process.

It is a stand-alone, plug-compatible product that provides ongoing statistical measurements of parts as they are inspected.

VSP analyzes measurements of parts by computing such statistics as averages and variances.

The results are reportedly displayed on a CRT or printed out as hard copy.

VSP is priced at about $12,000.

Itran, P.O. Box 607, 670 N. Commercial St., Manchester, N.H. 03105.

RTE Deltec Corp. has announced **Watchman I**, the first in a series of small standby power systems.

The units are said to include 20 minutes of battery backup time for personal computers.

Should the utility power fail, an alarm sounds, a red light flashes and the Watchman I takes over until utility power is again available. It then switches back to standby mode and recharges its battery.

According to a company spokesman, the units are compatible with personal computers from IBM, Apple Computer, Inc., Compaq Computer Corp., Kaypro Corp., Commodore Business Machines, Inc. and AT&T as well as other vendors.

The Watchman I standby power system is priced at $299.

RTE Deltec, 2727 Kurtz St., San Diego, Calif. 92110.

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Ronald Reagan, President
From his Message to
Conference participants, 1985

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COMPUTER INDUSTRY

Section begins on page 150

Japanese markets more open to U.S. than many execs claim

Nakasone helping to break down barriers

SECOND OF THREE PARTS

By Takehisa Kondoh
Computerworld News Service

TOKYO — Though some foreign executives in Tokyo still feel Japan has barricaded its markets to outsiders, many U.S. vendors are starting to hail the efforts of the Japanese government, and Prime Minister Yasuhiro Nakasone in particular, to make the nation's markets more competitive.

In recent years, a "tremendous amount of progress was made on all of the Japanese government's barriers, and a tremendous amount of credit belongs to Nakasone," says Lawrence F. Snoden, vice-president of Tokyo-based Hughes Aircraft International Service (Far East), the international marketing subsidiary of Hughes Aircraft Co.

Japanese markets are more accessible now than 10 or even two years ago, says Snoden, a past president of the American Chamber of Commerce in Japan, a group of U.S. businesses based in Japan. Today, he adds, the problem is not so much that barriers in Japan exist, but that U.S. businessmen still maintain that they exist.

Too many U.S. executives believe all the stories about the difficulty in doing business with the Japanese, Snoden charges.

Those executives, he believes, must be made aware "that the Japanese market has changed and is still changing and that Japan is a good place to come to."

The efforts of the Japanese government to open the door to foreign imports include the establishment in 1982 of the Office of Trade and Investment Ombudsmen (OTO), an agency that handles trade complaints from foreign businesses.

The agency operates under the slogan, "If you've got a gripe, we want to hear about it" and has received a total of 234 complaints of alleged trade barriers set up by the Japanese government. Roughly 220 of those complaints have already been processed, says Koyoshi Ota, director of the 20-member OTO.

Often, problems that beset U.S. businessmen in Japan stem from differences in the ways the two cultures approach agreements or treat customers.

For example, at Tokyo-based Nippon Ashton-Tate Co. — a joint venture established last June between the U.S. parent company and a Japanese software house — management has been perplexed by the divergent ways in which Japanese and American vendors relate to the concept of merchandising.

"U.S. users strictly define the purposes of purchasing," Nippon Ashton-Tate Vice-President Toshihiko Funayama observes. "What they expect from a $100 software product should naturally be different from what they want in a $1,000 item." He notes that Nippon Ashton-Tate's sales staff must always be aware that Japanese buyers lack this concept.

For product promotion, Funayama advises that U.S. makers modify or fine-tune their American style of advertising.

He also says that, while American users most often buy from among several choices they consider equivalent, "the first thing Japanese customers do is doubt everything offered to them. This forces us to spend a lot of time to persuade Japanese clients."

Japanese vendors also refuse to segment their target markets, a behavior that perplexes U.S. vendors here. Funayama says Ashton-Tate's U.S. effort to target corporate managers would never be used in Japan, because most Japanese firms lack managers with duties so clearly defined.

A key part of Japanese business culture is "wining and dining," a ritual that has become an essential to clinching a contract. Most U.S. businessmen, Hughes' Snoden says, view this practice coolly.

Sharing Snoden's view is Viktor Knoesel, president of Siemens K.K., the Japanese subsidiary of West Germany's Siemens A.G. "To accept a dinner invitation in Europe doesn't give you any commitment. We can always be neutral," he says. "The same should be true in Japan."

Siemens has operated in Japan for more than 100 years, but Knoesel warns that newcomers to Japan must establish a corporate identity in Japanese business circles. Before they meet a Japanese customer, Knoesel says, the sales representatives from a non-Japanese firm must make elaborate preparations, rehearsing how to present the company and its products to the customer.

The U.S. style of marketing does not work well in Japan, Knoesel says: "The Japanese mentality is just the opposite — if you want a success here, the straightforward method is very dangerous."

In Part Three of the series next week, Computerworld *will examine the challenges facing foreign computer vendors doing business in the U.S.*

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Lessors face taxing dilemma

Loss of tax credit forces market to specialize

By Michael L. Sullivan-Trainor

CHICAGO — Reflecting tremendous uncertainty within the computer leasing industry, concrete answers about the potential impact of tax changes on lease rates were hard to come by at the second annual Computer Leasing Conference and Expo (Comlease) held recently.

Unwilling to go out on a limb about specifics, leasing company representatives told about 80 users, in general terms, that their businesses will change drastically because of the likely elimination of the investment tax credit and increased lessor specialization.

"We are facing a new world," said Tom Martin, the conference chairman and president of Computer Financial, Inc., a Hackensack, N.J., leasing firm. "The cost of leases will increase significantly, and it will be crucial for lessees to re-evaluate the strengths of their lessors in light of the changing tax laws."

Because many leasing companies base their businesses on the tax advantages gained by the investment tax credit, they will either have to change their focus or go out of business, Martin said. In the future, lessors will likely be less dependent on IBM and will feature more specialized product lines. Microcomputers and telecommunications equipment, including digital private branch exchanges, are expected to receive increased attention in the leasing market.

Other tax reform proposals that will change current leasing practices include limitations on individual investors, making it less likely that they will consider computer lease deals desirable.

The Internal Revenue Service is paying increased attention to "wrap leases," in which leasing companies arrange for an investor to own equipment involved in a lease, thereby taking maximum advantage of the tax benefits. As a result, there may be an increase in the participation of institutional investors, who can afford to take greater risks.

In addition, Martin told users, the IBM mainframe market is mired in uncertainty because of the sluggish acceptance of the 3090s and the wide availability and declining price of used 3080s.

"If you think you're having trouble figuring out what the prices ought to be, we as lessors have the same problem. The market is moving too quickly and in some ways in an erratic fashion," he said.

Lessors are looking to 3090 enhancements to increase the popularity of the IBM Sierra over the 3080s. Martin predicted that IBM will soon announce software to allow faster transfer rates of 6M byte/sec., new 3090 models named the 300 and 600, as well as expanded function cache and controllers. Regular price cuts will continue, he added.

With the loss of some major tax benefits, the residual value — the remaining value of the equipment at the end of the lease — will become more important, speakers told attendees. Yet none of the many methodologies available for predicting residual value can promise total accuracy, and lessees are often forced to accept the lessor's assumptions.

Even equipment appraiser Ralph Page, a technical consultant for leasing with Marshall & Stevens, Inc. in Los Angeles, could not present a standardized method for determining re-

See **LESSORS** page 122

U.S. goes after emerging chip niches to challenge Japanese

By Clinton Wilder

NEW YORK — The worldwide semiconductor industry is undergoing a fundamental change that will permanently alter the competitive landscape for both U.S. and Asian suppliers, according to several industry executives and analysts at a recent investment conference.

Executives from industry giants and small niche companies told attendees at the recent L. F. Rothschild, Unterberg Towbin semiconductor conference that U.S. vendors can no longer compete with Far East firms in commodity chip markets, which now include virtually all memory chips.

Successful firms in the 1980s and 1990s will be those that capitalize on emerging markets for application-specific integrated circuits (ASIC), user-configurable chips and chips based on CMOS technology, they said.

"Fabrication technology itself is becoming a commodity," said Jack Carsten, senior vice-president and general manager of the ASIC group at Intel Corp. "Anyone who has the capital can buy state-of-the-art production equipment with virtually no experience. That's a natural evolution in most industries; we have to stop thinking that we're so different from everyone else."

VLSI Technology, Inc. Chairman and Chief Executive Officer Alfred Stein predicted that the world's top three volume chip producers in 1986 will be Japanese, an unprecedented occurrence that would dramatically illustrate the shift in the world industry. "This will also be the year that the size of the Japanese market passes the U.S.," Stein said.

Several panelists urged U.S. vendors to focus on design automation — selling better solutions to systems vendors designing their own chips. "You build a market with solutions, not products," said Phillip Kaufman, president of Silicon Compilers, Inc. "Design automation includes a lot of services that customers need."

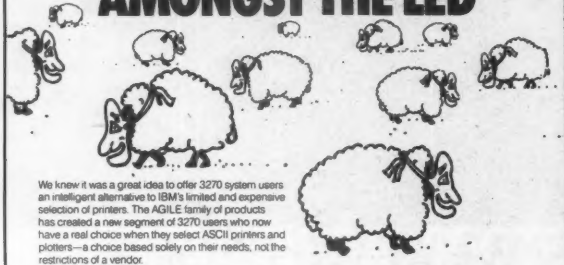
"The need for chip makers to understand system manufacture and design is going up exponentially," added Tim Propeck, vice-president of corporate marketing for Monolithic Memories, Inc.

One member of a panel of firms that purchase chips expressed dissatisfaction with U.S. vendors, particularly in the ASIC area.

"There are a lot of false promises in this industry," said Albert C. Wong, executive vice-president of microcomputer add-on board maker AST Research, Inc. "There is a lot of vapor from the industrial giants on

See **U.S.** page 124

HOW TO SPOT THE LEADER AMONGST THE LED



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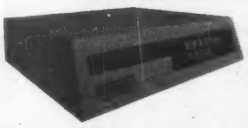

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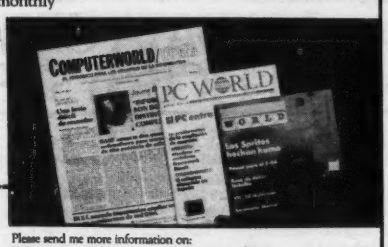

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EXECUTIVE REPORTS

Special Editorial Features

Every issue of Computerworld presents either a Product Spotlight or Executive Report. For advertisers, it's still not too late to take advantage of the hot topics set for July!

Expert Systems Shells (Product Spotlight, July 14) Features a comparison of the types of PC-based expert systems shells and presents a discussion of basic program capabilities and performance features. Also, a representative sampling of five shells now available for mini and mainframe applications. Plus, a product chart featuring up to 30 vendors and products. Closing date June 27.

PBX Networks (Product Spotlight, July 21) Explores the latest in PBX technology with a look at corporate applications. Examines digital versus analog PBX systems and advises readers on data transmission alternatives — when a PBX is the right choice over a LAN, and vice versa. Closing date July 3. (Note early close)

Management Training for DP Executives (Executive Report, July 28) Are MIS/DP professionals too technically oriented to be effective managers? A lack of people-managing skills can create numerous problems — including the alienation of workers. This report also looks at packages that are available to address this issue. Closing date July 11.

And it doesn't stop there! Important and pertinent Executive Reports and Product Spotlights topics continue through August and September.

ISSUE	TOPIC	CLOSING DATE
August 4	Applications Generators (Product Spotlight)	July 18
August 11	Information Centers (Executive Report)	July 25
August 18	End-user Computing (Executive Report)	August 1
August 25	Image Processing (Product Spotlight)	August 8
September 1	The MAP Marketplace (Executive Report)	August 15
September 8	Computer Leasing (Executive Report)	August 22
September 15	Spreadsheets (Product Spotlight)	August 29
September 22	Communications Standards (Executive Report)	September 5
September 29	On-line Computing (Executive Report)	September 12

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PRODUCT SPOTLIGHTS

GM, Toyota may join telecom service venture

By Takehisa Kondoh
Computerworld News Service

TOKYO — Japanese trading house C. Itoh & Co. has reportedly asked Toyota Motor Corp. and General Motors Corp. to participate in the creation of a transborder communications service firm.

Sources said both vendors have agreed to join the $719 million project, in which the UK's Cable and Wireless Public Ltd. (C&W) is already a participant.

Communications industry experts in Tokyo said that they believe the Toyota-GM joint effort with C. Itoh threatens Kokusai Denshin Denwa Co. (KDD), which has monopolized the Japanese overseas telecommunications market. That market is growing by 17% annually and is expected to reach an estimated $7.7 billion by 1995.

While a Toyota spokesman would not say whether the company has chosen to participate, he said the company is "deeply interested in international communications. That certainly will give us a great business opportunity."

The international telecom project will take shape when the four firms launch a company that will conduct a feasibility study. The research company will also be financed by three Japanese banks, said C. Itoh, the project's coordinator.

The joint telecom firm itself will open its doors in about 1990, using C&W's existing network between Hong Kong and London as well as the optical-fiber cables C&W is constructing beneath the Atlantic Ocean and in North America.

For communication between the U.S. and Japan, a transpacific undersea optical-fiber route will be constructed under a separate project, with financing from C&W and GM.

Nippon Telegraph and Telephone Corp. (NTT), meanwhile, is believed to be providing technical assistance to the C. Itoh project through an engineering and consulting subsidiary, NTT International. NTT itself is banned from doing business in overseas communications.

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See the classified section

COMPUTERWORLD
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IBM backlog at record high

From page 150

processors is an indication that the price elasticity may indeed still be with us.

The fact that 3090 sales represent an area of strength within IBM's generally sluggish business should also dispel the recent theories frequently heard, especially on Wall Street, that an apparent lack of functional differentiation from the 3080 mainframes is hurting the 3090.

Since the 3090 is still selling well, debates about what may be hurting its sales are an example of solutions looking for nonexistent problems.

Such opinions probably reflect the efforts of some analysts who are groping for excuses to explain their earlier multibillion dollar overestimates of IBM revenue.

The most encouraging news for IBM shareholders is a 40% increase in the gross margins on service.

Fueled by a rise in software prices, especially for the XA operating systems, this IBM business segment's gross margins now exceed 60% for the first time. At 62% of revenue, the service gross margins are now up four points since a year ago and 17 points since 1978.

Another piece of good news for IBM is the fact that after years of spending billions on new plants and equipment (over $20 billion in the last six years), IBM has finally started to curtail its capital spending.

Largely due to the projects already under way, this year's capital spending plan is likely to be flat compared with that of 1985.

Lessors to face taxing dilemma

From page 120

sidual value, particularly for the large IBM systems.

"How do you determine the trade value of a 3090?" Page said.

"None have been traded on the used market. My personal opinion is that the 3080s will have a longer life than the experts are predicting because of the 3090's slow acceptance," Page said.

Discussing the leasing options available for microcomputers, Leonard Cohen, president of Scientific Leasing, Inc. in Farmington, Conn., said that the residual value of personal computers is currently between 20% and 25% of the purchase price, depending on the PC's brand and configuration.

Residual value

Predictions also are hard to come by concerning the residual value of PBXs and other communications products because the market is changing so rapidly and because evolving standards may determine future equipment value.

Comlease had only eight leasing companies in attendance, as opposed to 16 last year.

Some major leasing companies, notably IBM Credit Corp. and Greyhound Leasing and Financial Corp., were not in attendance.

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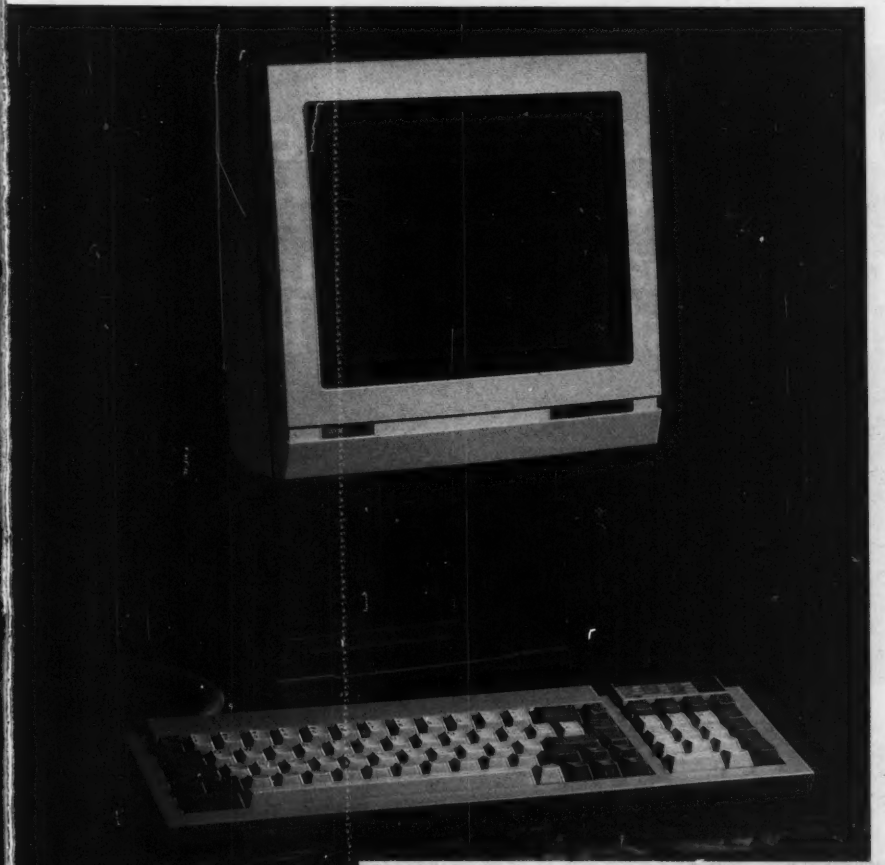

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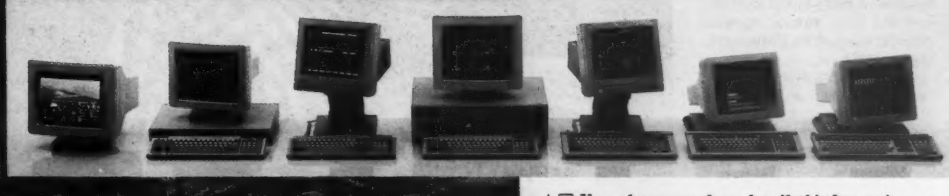

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Professional services firm to expand into corporate sector

PRC seeks talent, skills via buy-outs

By Mitch Betts

MCLEAN, Va. — Planning Research Corp. (PRC), which recently has concentrated on the lucrative business of handling large systems integration projects for the U.S. government, is on the verge of expanding into the corporate sector, the firm's president said in a recent interview.

Recognizing that it takes different skills to win commercial contracts, Wayne Shelton, president and chief operating officer, says PRC will obtain the necessary talent through either an acquisition or an in-house investment within the next year.

Industry analysts say that PRC is on the right track, pruning its unprofitable businesses, focusing on government computer systems integration and centralizing management.

Christopher W. Mortenson, analyst with Alex Brown & Sons in Baltimore, said in a recent report that acquiring a small or medium-size computer services firm with a corporate client base would be a plus for PRC. "The company's technical and project management skills are readily transferable to the corporate sector," he said.

PRC is no stranger to acquisitions. It began 32 years ago as a think tank and, through a series of acquisitions in the 1960s and 1970s, moved into about 30 different professional services markets, ranging from architectural and engineering services to computer programming.

But over the past few years, PRC has been shedding many of its lackluster business ventures and narrowing its focus to federal information systems contracts. PRC's star performer is its Government Information Systems Group, which Shelton headed before his promotion to the new position of chief operating officer last August.

In the first six months of 1986, the group accounted

U.S. focuses on chip niches

From page 120

the ASIC bandwagon." Wong said that five of his company's 11 ASIC designs are supplied by Japanese vendor NEC Corp.

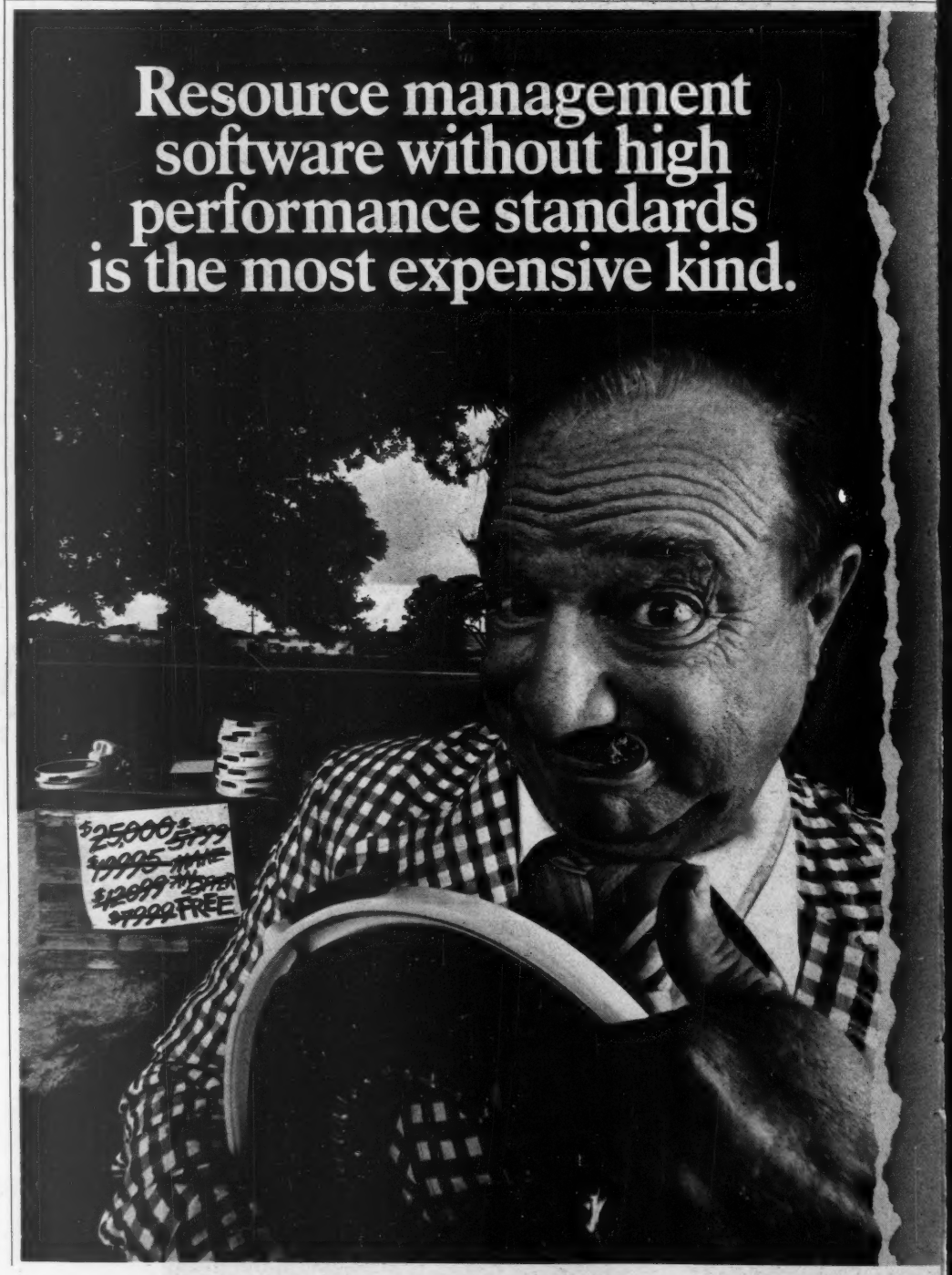
Michael Hackworth, president and CEO of ASIC vendor Cirrus Logic, Inc., said the ASIC market is poised for growth, but is still in its infancy. "The roles of vendors, users and makers of design tools are still being sorted out," he said. "There is a lot of confusion and smoke right now, but each niche will find its right mix of those roles."

The overall U.S. chip industry will grow by 9.5% this year, said Andrew Rappaport, president of the Boston-based Technology Research Group. That figure represents a solid rebound from the industry's worst-ever recession in 1985 but is well below the 20% annual growth rates predicted by Dataquest, Inc. in 1984.

Clyde Prestowitz, former counsel to the U.S. Secretary of Commerce and a driving force behind recent U.S. anti-dumping actions, painted a discouraging picture of the U.S.-Japan trade outlook.

He placed the U.S. semiconductor industry's competitive decline in the broader context of all U.S. industries, which face higher costs of capital, a lower literacy rate and much more short-term stockholder pressure than their Japanese rivals. "Trade actions may help, but the real issue over the next five to 10 years is to improve the fundamentals," he said.

Prestowitz said that except for IBM and AT&T, U.S. high-tech firms lack vertical integration, or the practice of buying components from other units of the same corporation.



for about 35% of PRC's total revenue and 52% of operating profits. Overall, PRC had revenue of $372 million in fiscal 1985, and analysts expect revenue to reach $450 million in fiscal 1986.

Federal government contracts make up 57% of PRC's sales, but the company is choosy about the contracts it pursues.

It bids only on large contracts for complex information systems that require a high degree of innovative integration, according to Floyd Jean, president of the applied systems division.

PRC executives like to point to the company's $289 million contract to develop an automated patent storage and retrieval system for the U.S. Patent and Trademark Office as the kind of business they covet. The contract requires linking optical disk drives to custom workstations for use by patent examiners.

PRC's intent is to win a few similar contracts, valued at $100 million or more, each year, as well as numerous "bread and butter" contracts in the $20 million to $50 million range, Jean says.

An example in the latter category is PRC's $30 million contract with the U.S. Army for a worldwide office automation system, which is custom-designed for use by investigators from the Army's inspector general office, according to John Cover, who directs the project for PRC.

Analysts say the big risk for PRC is that federal budget-cutting legislation could stall or kill some of its federal contracts. But PRC executives say they do not foresee any drastic reductions in business with Uncle Sam.

To be more competitive in winning contracts, Shelton is also trying to centralize management in what had been very independent operating units. Shelton has appointed a high-level technology czar to prod the operating units into sharing and exploiting their proprietary technologies.

Shelton and John Lytle, the new corporate director of technology development, say that PRC's long-run strategy is to continue attracting highly skilled computer professionals by offering them challenging work .

"Employees tell us they want one hard assignment after another. That's very positive motivation," Lytle says.

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Eagle files for bankruptcy, seeks investor

GARDEN GROVE, Calif. — Eagle Computer, Inc. recently filed for protection from its creditors under Chapter 11 of the U.S. Bankruptcy Code.

Eagle is looking for new investors, and if financing is found, the company will reorganize according to a court-approved plan, Eagle President Gary Kappenman said.

If Eagle does not have an investor in the next 50 to 90 days, he added, the company will file for total liquidation under Chapter 7 of the Bankruptcy Code.

Investors frightened off

The company said its Chapter 11 filing was prompted by large debts, which had frightened off potential investors, and by a need to gain protection from several lawsuits.

The microcomputer company currently has an estimated $7.2 million and claims to have only $200,000 in assets.

Of the debt, the company owes $4.8 million to the Bank of America of San Francisco and the remainder to 370 creditors.

Before the Chapter 11 filing, Eagle reported a loss of $2.3 million, or 9 cents per share, for its third quarter, which ended March 31.

For the same quarter last year, Eagle reported a loss of $1.6 million, or 8 cents per share.

Revenue for the recent quarter totaled $816,000, compared with $2.5 million a year earlier.

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L. J. Kutten

There are a multitude of steps a trade secret owner can take to internally protect a trade secret.

First and foremost, a trade secret owner is required to take only reasonable steps to protect the trade secret. Absolute secrecy is not required. However, the exact amount of security necessary is relative. It depends on the nature of the secret and its value to the owner.

Among activities that are significant in a review of internal security measures are the following:

- Have all employees dealing with confidential materials sign nondisclosure and noncompetition agreements. If one employee in a department signs, then all must sign. More than one court has viewed such a failure as a fatal blow to a claim of trade secrecy.
- Advise the employees of the confidential nature of the product they are working on. This includes support staff employees such as secretaries and the like.
- Restrict dissemination of confidential material to those who need to know.
- Physically secure buildings, equipment and computer equipment.
- Describe in detail to all employees the scope of the job and the scope of access they are to have within the system.
- Place proprietary notices on all important documents.
- Establish procedures wherein computers containing the trade secret cannot be accessed via telephone lines from outside the system.
- Secure the premises so that the trade secret material is separated by locked doors from the general public.
- Establish universal use of identity badges.
- Establish security audit measures and follow them.
- Establish a magnetic media storage system under which the contents of the magnetic media are not shown on the outside.
- Keep track of the number of copies made.
- Establish a standard by which employees identify their work product.
- Encrypt working data and programs.
- Monitor computer use by installing a billing system so that accurate records can be kept of how much each department and user is using the system and for what purposes.
- Assign specific individuals, data procedures, computer users, explicit ownership and custodial accountability and use rights to certain types of data.
- Establish a method of destroying documents and magnetic media before discarding them.
- Require that all materials containing trade secrets or confidential materials be locked away at night.
- Secure terminals and files in such a way that physical possession of an actual key or knowledge of a password is required for access.
- Change keys and doors to terminals and change passwords on a semiregular schedule.

This list does not contain everything that should or must be done. Internal security is relative and depends on the size of the organization, the nature of the product being worked on and similar criteria. However, no amount of alleged protection will be sufficient if the owner does not treat the material as a secret.

Kutten is a member of the Missouri and Illinois bars and author of The Computer Buyer's Protection Guide, *published by Prentice Hall, Inc.*

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Timeplex, Inc. announced revenue for the third quarter ended March 31 of $30 million, compared with $24.6 million in the previous year. Profits were $1.6 million, or 19 cents per share, compared with $2.3 million, or 26 cents per share, one year ago.

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Jubilation

Word-a-holics unite!

Trying to decide which word processor to buy is like trying to decide which college to go to. The decision will change your life forever, but you may never know if it was the best one. Here are five tried and proven professional packages. They all have spell checkers. None are copy-protected. And hard drives are recommended for all. See PC Magazine 1/28.

MultiMate Advantage 3.6 with Graphlink and On-File $289
Originally designed to emulate the WANG word processor, MultiMate is often referred to as the corporate word processor. It offers sophisticated networking capabilities, and, with two free-for-a-limited-time software programs (Graphlink and On-File), also has built in graphics and database.

MicroSoft Word 3.0 with Outline $247
With a mouse and a graphics card, MicroSoft Word lets you move words around without touching the keyboard, and see what you got without squinting. Without a mouse or a graphics card it's still a powerful word-processor, with "Style Sheets" that simplify formatting, and a built-in outline program.

WordPerfect 4.1 .....$239
We have a friend who writes for computer magazines. At one time or another he has used and reviewed virtually every major word processor. He now swears by WordPerfect and swears at all the others. Use this program for a while and you'll be able to touch type most of your commands with your eyes closed and your right hand tied behind your back.

WordStar 2000 Plus Release 2 .....$285
WordStar has had some trouble shedding its image as the lumbering dinosaur of the microcomputer age. But hundreds of thousands of people use it. There are a lot of programs out there to back it up. And this new version gives it the same advanced features as any top-quality word processor. Even the control keys are starting to make some sense.

Volkswriter 3.0 .....$147
Solid performance with a reasonable price continues to be Volkswriter's claim to fame. It's fast, and boasts one of the original what-you-see-is-what-you-get screens. With the new version's spell checker and more sophisticated print formatting, it is now able to compete functionally with the other high-end word processors. (Our new low price is pretty persuasive too).

Buy one. Get two.

Hey, got a friend? Don't know? Check your database! What? No database? Have we got a deal for you (and your friend). Until June 30, Microrim will send you a *complete* second copy of R:base 5000 free when you send in your warranty card and a copy of our sales invoice. So you can get together with your friend, split the cost for one and get two! Or, you can keep the extra copy at home, at a branch office, or down the hall. R:base 5000 is easy to learn and operate, and has the custom reporting features most users need. Remember, the two for one offer is only good from April 15 till June 30.

R:base 5000 .....$359
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Chips

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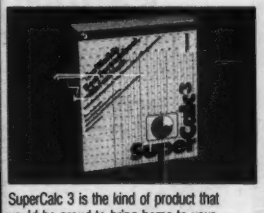
64K (150Ns)	$15 ea. set
128k or **256k** (150Ns)	$39 ea. set

Bernoulli Berserk!

We've got a problem. The prices we're able to offer on Bernoulli boxes are changing about 10 times faster than we can change this ad. Probably because the machines are selling about 10 times faster than anyone ever dreamed they would. The 20 Meg and 40 Meg versions feature two ½ height drives with removable cartridges. There's a 90 day warranty, and we're an authorized Bernoulli service center—turn-around on repairs is usually 24 hours. Here are our latest up-to-date-but-probably-obsolete-by-now prices!

Bernoulli Box 40 Meg $2499
Additional 20 Meg Cartridges $69
Bernoulli Box 20 Meg $1999
Additional 10 Meg cartridges $51
Bernoulli Care Kit $79

Supercalc ifragilistic!



SuperCalc 3 is the kind of product that you'd be proud to bring home to your mother. Like Lotus 1-2-3 it offers spreadsheet, information management and presentation graphics. But it only needs 128k of RAM, and is not copy-protected. It also is compatible with the Hercules Monochrome Card, as well as the Enhanced Memory (EMS) and Enhanced Graphics (EGA) standards. And you get a free copy of Sideways, the program that lets your printer think horizontal is vertical.

SuperCalc 3 2.1 (with Sideways) .....
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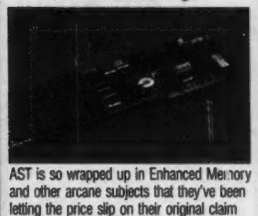
SixPakPlus Minus$!



AST is so wrapped up in Enhanced Memory and other arcane subjects that they've been letting the price slip on their original claim to fame—the AST SixPakPlus, one of the original and best multifunction cards. So if you're just starting in computing, or outfitting a second unit for home, now's a great time to buy this basic piece of hardware. You get a clock calendar, serial port, parallel port, up to 384k of memory, *and* copies of two classic unprotected programs—Sidekick 1.5 and DESQView. A genuine deal.

SixPakPlus 64k $169
SixPakPlus 384k (fully populated) $219

Herculean rebate!

The Hercules monochrome graphics card has saved hundreds of thousands of PC owners from terminal myopia, by supplying crisp clean monochrome graphics. The Hercules color card is the industry standard for color graphics. Both come with a parallel printer port, and a *full two year warranty.* And from May 1 through August 31, Hercules is offering a $50 rebate on either card.

Hercules Monochrome Graphics Card $299
(and get $50 rebate from Hercules)
Hercules Color Card (1/2 slot) $159
(and get $50 rebate from Hercules)

Disks (10 per box)

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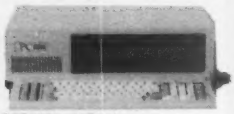

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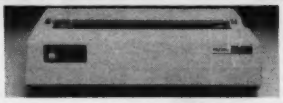

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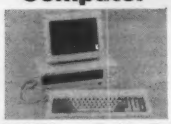

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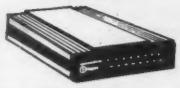

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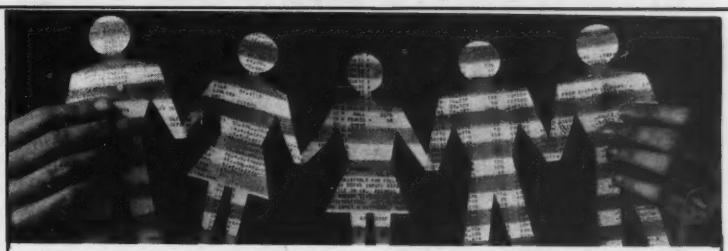

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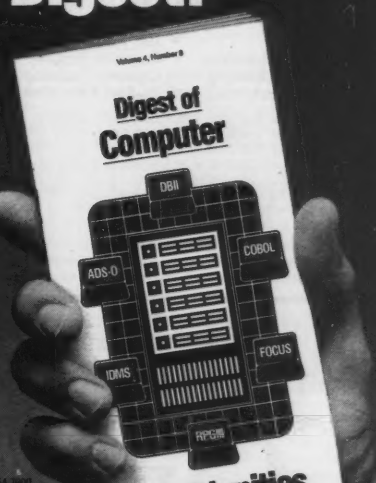

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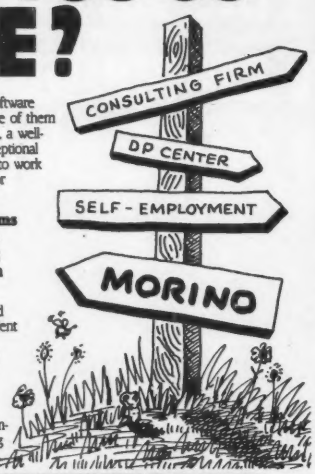

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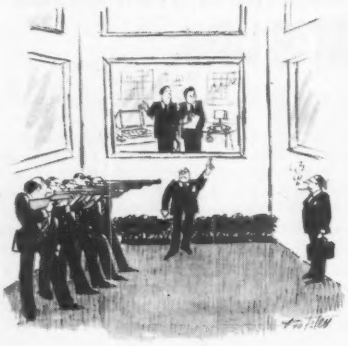

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INDUSTRY NOTES

Micropro posts third-quarter loss

Micropro International Corp. announced a loss of $2.4 million, or 19 cents per share, for the third quarter ended May 31. President H. Glen Haney attributed much of the loss to the recent bankruptcy filing of distributor First Software, which owes Micropro $1.4 million. Third-quarter sales plunged 76% from year-earlier levels to $2.4 million.

■

IBM announced a major retail marketing plan under which high-volume customers can buy products from IBM direct salespeople or from authorized dealers or value-added dealers. Customers who buy machines from dealers will have those purchases applied to their volume purchase agreement commitments, IBM said. In the past, only purchases from IBM's direct sales force could be put toward volume purchase agreement commitments.

■

The 53-member **Corporation for Open Systems** is poised to announce this week that it will accept members from both Europe and Japan as soon as it can change its organizational bylaws.

■

Akers sees IBM profit drop

From page 150

commodity-like, you will see IBM departing those businesses."

IBM System Products Division President Stephen Schwartz said the company remains committed to two separate architectures for its mid-range systems — the System/34, 36 and 38 and the low-end 370 architecture.

"We have been criticized in the past for confusion over whether we support a two-tier or a three-tier strategy," Schwartz said. "Let me put that to rest. We support both. We have 200,000 customers of the System/34, 36, 38 product line. We will not abandon them."

When an analyst questioned why last Monday's mid-range announcements (see story page 1) did not include better software mobility between the System/36 and System/38, Schwartz said the "No. 1 priority" was to provide users with better access from terminals to each host system.

"But," he added, "we will continue to bring the System/36 and 38 closer together. Time will tell how that will unfold."

Terry R. Lautenbach, president of IBM's Communication Products Division, also reaffirmed the company's multiple-architecture philosophy in communications. He said the firm will continue to "marry" Rolm Corp. and IBM technology as well as open Systems Network Architecture (SNA) to non-IBM products and continue to enhance the Token-Ring local-area network.

"Even SNA took a while to catch on, and we expect that same process of acceptance with the Token-Ring," Lautenbach said.

Lautenbach said engineers from the Communication Products Division, IBM's research division and Rolm are now working on long-range product development at IBM's Advanced Telecommunications Systems Lab. "We intend to be the telecommunications leader, and we still have a lot of work to do," he said.

Akers noted that IBM is paring expenses considerably while business is slow but added that the company would prefer to take "short-term financial hits" rather than alter its no-layoff tradition or reduce research and development outlays.

IBM has instituted a virtual freeze on U.S. hiring in all areas except its marketing and sales force, and Akers commented that for the first time since 1975, IBM's domestic work force this year will decline.

He also said that IBM's R&D spending would increase by just 7% in 1986, compared with a 12% rise last year. Spending for plant property and equipment will remain flat at 1985's level of about $6 billion. Akers said IBM would cut travel, meeting and consulting expenses by more than the $700 million by which they were reduced last year.

Senate expected to pass tax bill

From page 150

tion between the old rules and the new.

Under the transition rules, the Senate bill's new investment depreciation schedules would not apply to MCI's 10-state communications network or United Telecom's 20,000-mile fiber-optic network. Both of these networks are under construction.

Likewise, the new depreciation rules would not apply to Federal Express' investment in two new satellites or RCA Corp.'s investment in three new satellites.

The bill also gives CDC a special exemption from the minimum corporate tax on profitable companies. "Our tax department discovered that the minimum tax provisions would have had an apparently unintended negative impact on companies such as Control Data, which had large losses last year," a company statement explained.

In no case is a company actually named in the transition rules, however. For example, in the case of Federal Express, the bill states that the rule applies to two satellites that were authorized by the Federal Communications Commission on July 25, 1985 and cost $120 million.

The provision for CDC states that it applies to "a taxpayer which was incorporated in Delaware on May 31, 1912."

Analysts split on duration of General Datacomm upturn

ACTIVE ISSUES
Kathy Porteus

In past weeks, General Datacomm Industries, Inc. (GDC — 12½) has been one of a handful of communications stocks to show new signs of life. But analysts disagree on whether such activity is sustainable.

According to Thomas Linkas, senior technology analyst with Goldman Sachs & Co., General Datacomm's March quarter results revealed initial signs of a turnaround in the company's performance, which strong product introductions, good distribution and a modest upturn in computer industry shipments should sustain.

General Datacomm's new products include a networking T1 multiplexer called Megamux II, a new version of its network management and control system and new 9.6K bit/sec. modems. The company is particularly susceptible to computer shipment trends, because roughly half of its sales are modem products.

"General Datacomm has also been able to reduce its costs by about 25% to 30% in one third of its business," says Ted Moreau, vice-president with Robert Baird & Co. Moreau says he would recommend purchase of General Datacomm even if he did not see a computer industry upturn.

"General Datacomm is well positioned," Moreau maintains, "because its broad product line provides an attractive alternative to the rising cost of using deregulated networks."

However, Andy Schopick, vice-president with Gartner Securities, says he feels negative about General Datacomm's prospects. "The company's performance will be subpar and not justify any sustainable move in the stock," Schopick predicts. Schopick estimates General Datacomm will earn 80 to 85 cents per share in fiscal 1987.

While recognizing that General Datacomm's business is not getting dramatically worse, Schopick contends that competitive pressures in the company's key markets will prevent "as strong a recovery as some people would like to believe."

Grounds for questioning the success of General Datacomm's near-term financial performance, according to Schopick, are increasing price competition, AT&T and IBM's greater thrust into the modem industry and the lack of product innovation, especially when compared with multiplexer companies such as Avanti Communications Corp. or Network Equipment Technologies Co.

According to Joseph Bellace, vice-president with Merrill Lynch, Pierce, Fenner & Smith, "the jury is still out on General Datacomm." In order to change his neutral opinion on the company, Bellace says, he must first see General Datacomm gain share in the T1 multiplexer market.

Bellace says General Datacomm must also demonstrate greater financial control in order to reduce its inventory to sales ratio, which is currently the highest in the communications industry.

The company's operating profit has languished between 1% and 3% so far this year, according to Bellace, although nonrecurring items and a tax credit will boost earnings to about 40 cents per share for fiscal 1986, ending Sept. 30th.

'Cash-flow positive'

Nevertheless, Goldman's Linkas argues, "General Datacomm has been, and will continue to be, a cash-flow positive and has borrowing capacity of another $90 million." The company's current break-even operating rate, according to Linkas, is about $45 million in sales per quarter.

Linkas estimates the company will earn 43 cents per share this year and $1.10 to $1.25 per share in fiscal 1987. These projections are contingent upon the continued favorable reception of General Datacomm's new products and continuing, albeit modest, pickup in the computer industry.

Given these factors, Linkas says he believes the stock can "easily approach its former high of $22."

Porteus is president of Strand Research Associates, a Centerville, Mass.-based company that provides customized research services for financial and high-tech firms.

Cullinet earnings down, sales flat

WESTWOOD, Mass. — Cullinet Software, Inc. showed the strain of a continuing slump in the mainframe software industry, announcing yesterday flat sales and a $9.4 million drop in earnings for the fiscal year ended April 30.

Cullinet sales were $184.3 million, compared with $184.1 million a year ago.

Income for the year was $15.3 million, or 50 cents per share, down from $24.7 million, or 81 cents a share, a year ago.

Despite some heavy industry criticism of its IDMS/R data base management system, Cullinet fourth-quarter sales inched up 3% above year-ago figures to $54.2 million.

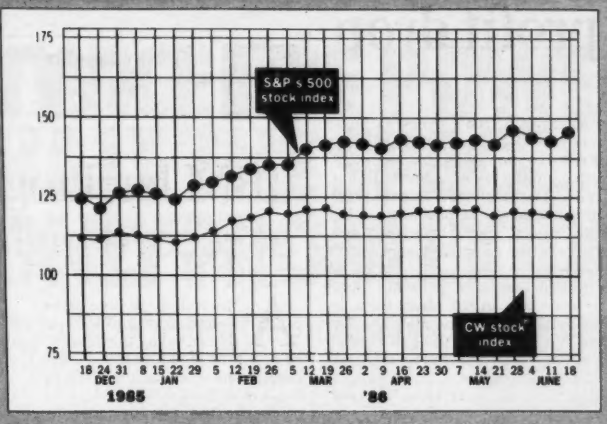
However, income in the fourth quarter dropped 47% to $3.6 million, or 12 cents per share, compared with fourth-quarter earnings of $6.9 million, or 22 cents per share, in fiscal 1985.

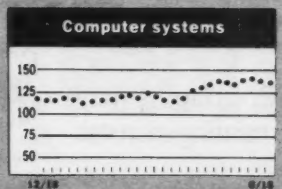
— Maura McEnaney

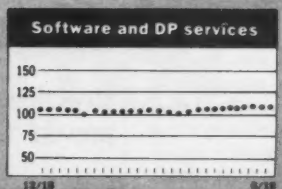
COMPUTER INDUSTRY

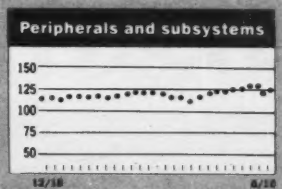
MITCHELL J. HAYES

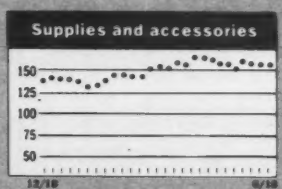
Computerworld stock trading index

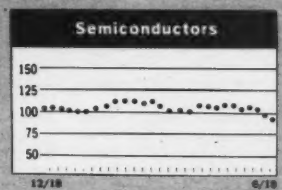


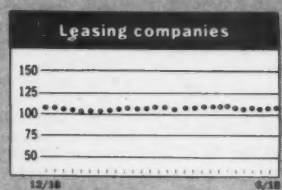












All indexes reflect a historical base of 100 on Dec. 31, 1984, and trace stock market performance in relation to that base. The CW stock index represents the unweighted average performance of the six categories of computer industry stocks.

	6/11/86	6/18/86
Computer systems	128.0	128.3
Software and DP services	106.3	106.8
Peripherals and subsystems	124.1	123.0
Supplies and accessories	154.4	154.2
Semiconductors	99.6	92.5
Leasing companies	104.0	104.2
CW stock index	119.0	117.2
Standard and Poor's 500 stock index	144.2	146.5

Computerworld stock trading summary

CLOSING PRICES WEDNESDAY, JUNE 18, 1986

COMPUTER SYSTEMS

EXCH		52-WEEK RANGE (1)		CLOSE JUN 18 1986	WEEK NET CHNGE	WEEK PCT CHNGE
O	ALPHA MICROSYSTEMS	5-	9	5 7/8	-3/8	-6.0
O	ALTOS COMPUTER SYST	9-	19	16 1/4	-3/8	+2.3
A	AMDAHL CORP	10-	18	17 1/2	-5/8	-3.4
O	APOLLO COMPUTER	9-	31	12 1/2	-1 1/4	-9.0
O	APPLE COMPUTER INC	14-	39	34 1/4	-1 7/8	-5.1
N	AT&T	19-	28	25 1/8	+3/4	+3.0
N	BURROUGHS CORP	52-	71	60 7/8	+1 5/8	+2.7
O	COMPAQ COMPUTER CP	5-	18	14 1/4	-1 1/4	-8.0
O	COMPUTER AUTOMATION	1-	9	3	-1/8	-4.0
A	COMPUTER CONSOLES	5-	14	10 1/8	-7/8	-7.9
N	CONTROL DATA CORP	15-	39	24 1/8	+5/8	+2.6
O	CONVERGENT TECHNOL	5-	13	7 5/8	-1/8	-1.6
O	CPT CORP	4-	8	4 3/8	+1/16	+1.4
N	CRAY RESEARCH INC	25-	94	89 1/4	-2 1/4	-2.4
O	DAISY SYSTEMS CORP	11-	38	11 1/2	-1/2	-4.1
N	DATA GENERAL CORP	31-	76	37 1/4	-1 3/4	-4.4
N	DATAPOINT CORP	5-	22	8 5/8	+3/8	+4.5
N	DIGITAL EQUIPMENT	42-	91	83 7/8	-3 3/8	-3.8
A	EECO INC	13-	20	19 3/4	-1/4	-1.2
N	ELECTRONIC ASSOC.	3-	7	5 3/8	-1/8	-2.2
N	FLOATING POINT SYST	18-	42	35 7/8	-1	-2.7
N	FOXBORO	22-	31	31	+5/8	+2.0
N	GOULD INC	20-	38	20 3/4	-2	-8.7
N	HARRIS CORP	22-	35	31 1/2	-1/8	-0.3
N	HEWLETT-PACKARD CO	29-	46	41 7/8	-7/8	-2.0
N	HONEYWELL INC	54-	87	75 7/8	-4 1/8	-5.1
N	IBM	117-	158	146 3/8	-2 3/4	-1.8
O	IPL SYSTEMS INC	1-	4	3	0	0.0
N	ITT CORP	26-	48	45 1/8	0	0.0
N	M/A-COM INC	13-	24	17	-3/8	-2.1
N	MANAGEMENT ASSIST	2-	28	2 1/2	0	0.0
N	MATSUSHITA ELEC(ADR)	49-	98	88 7/8	-7/8	-0.9
O	MENTOR GRAPHICS	13-	30	16 3/8	-7/8	-5.0
N	MODULAR COMPUTER SYS	6-	9	8 7/8	0	0.0
N	MOHAWK DATA SCI	1-	13	2 7/8	-1/8	-4.1
N	NBI INC	11-	20	11 3/4	+1/2	+4.4
N	NCR	25-	56	52 1/4	-7/8	-1.6
N	PERKIN-ELMER	22-	36	27	-3 1/8	-10.3
N	PRIME COMPUTER INC	15-	27	18 1/8	-1 3/8	-7.0
N	SPERRY CORP	39-	75	75 1/8	+5/8	+0.8
O	STRATUS COMPUTER INC	9-	25	21 1/2	-3/4	+3.6
O	TANDEM COMPUTERS INC	13-	34	30	-2 3/4	-8.3
N	TANDY CORP	24-	44	40	-1/2	-1.2
O	TELEVIDEO SYSTEMS	2-	4	3 1/8	+1/8	+4.1
N	TELXON CORP	6-	23	22 1/2	-1/2	-2.1
N	TEXAS INSTRUMENTS	86-	141	119 1/2	-10	-7.7
A	ULTIMATE CORP	8-	34	30 3/8	-3/8	-1.2
O	VECTOR GRAPHICS INC	1-	1	1 1/8	0	0.0
A	WANG LABS "B"	15-	29	15 5/8	-5/8	-3.8
N	WANG LABS "C"	15-	29	15 3/4	-1/8	-0.7
N	XEROX CORP	37-	72	55 1/8	-2 1/8	-3.7

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EXCH		52-WEEK RANGE (1)		CLOSE JUN 18 1986	WEEK NET CHNGE	WEEK PCT CHNGE
N	AMERICAN BUS PRODS	21-	36	33 1/8	+1/2	+1.5
N	BARRY WRIGHT	17-	29	23 1/8	-1/2	-2.1
A	DUPLEX PRODUCTS INC	13-	22	21 1/8	0	0.0
N	ENNIS BUS. FORMS	14-	28	25 7/8	-3/8	-1.4
N	3M COMPANY	74-	111	111 3/8	+4 5/8	+4.3
N	MOORE CORP LTD	15-	27	25	+3/8	+1.5
O	STANDARD REGISTER	22-	45	39 1/4	-1/2	-1.2
N	WALLACE COMP SERVICE	30-	49	44 5/8	-1 5/8	-3.5

SOFTWARE & DP SERVICES

EXCH		52-WEEK RANGE (1)		CLOSE JUN 18 1986	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	2-	6	5 1/4	0	0.0
N	ADVANCED SYSTEMS INC	9-	20	17 3/4	0	0.0
N	AGS COMPUTERS INC	10-	25	18 5/8	-2 3/8	-11.3
O	AMERICAN SOFTWARE	9-	15	13 1/4	+3/4	+6.0
N	ANACOMP INC	5-	11	5 3/4	-1/2	-8.0
O	ANALYSTS INTL CORP	2-	6	6 1/8	+7/8	+16.6
O	ASHTON TATE	6-	34	26 1/2	-5 3/8	-16.8
O	ASK COMPUTER SYSTEMS	7-	25	11 3/4	-1/2	-4.0
B	ASTRADYNE COMP IND	1-	3	1 1/2	-1/8	-11.1
N	AUTOMATIC DATA PROC	18-	39	34 3/4	-1 1/4	-3.4
O	COMPUTER NETWORK	5-	9	7 5/8	0	0.0
O	COMPUTER ASSOC INT'L	9-	25	24 3/4	+1/4	+1.0
O	COMPUTER HORIZONS	5-	14	14	0	0.0
N	COMPUTER SCIENCES	13-	39	39	+1/2	+1.2
O	COMPUTER TASK GROUP	7-	19	17	-1/4	-1.4
O	COMPUTER USAGE	1-	3	2 1/2	-1/4	-9.0
O	COMPUTONE SYSTEMS	3-	11	3 1/8	0	0.0
O	COMSERV CORP	1-	6	3 7/8	+3/8	+10.7
O	COMSHARE	7-	13	13 1/8	0	0.0
N	CULLINET SOFTWARE	12-	33	13 3/8	-1 3/4	-11.5
O	CYCARE SYSTEMS INC	13-	27	15 1/4	-3/4	-4.6
O	HOGAN SYSTEM INC	4-	12	10 7/8	-7/8	-7.4
N	GENERAL ELECTRIC CO	56-	81	81 1/4	+1 5/8	+2.0
N	GENL MOTORS E (EDS)	20-	49	47 3/4	+1/4	+0.5
N	GTE CORP	36-	54	50 3/4	-1/4	-0.4
O	INFORMATION SCIENCE	1-	5	3 1/2	+1/8	+3.7
O	INFOTRON SYSTEMS CP	13-	24	15 1/4	+1/4	+1.6
O	KEANE ASSOCIATES	10-	20	14 3/4	+1/4	+1.7
N	LOGICON	25-	43	34 3/4	-1/4	-0.7
O	LOTUS DEVELOPMENT CP	15-	38	36	-1 3/4	-4.6
O	MCI COMMUNICATIONS	7-	13	10	+1/4	+2.5
O	MNGT SCI AMER INC	7-	16	13 3/4	-1 3/4	-11.2
O	MATHEMATICAL APP GRP	1-	8	1/2	0	0.0
O	MICOM SYSTEMS INC	12-	35	13	-3/4	-5.4
O	MICROPRO INT'L CP	2-	4	2 1/4	-1/8	-7.4
O	NATIONAL DATA CORP	8-	25	18 5/8	-2 3/4	-12.8
O	ON-LINE SOFTWARE INT	4-	16	13 3/4	-1 1/4	-8.3
N	PANSOPHIC SYSTEMS	14-	35	29 1/4	-3	-9.3
N	PLANNING RESEARCH	11-	23	19 1/2	0	0.0
O	POLICY MGMT SYSTS CP	16-	35	18	-1	-5.2
O	PROGRAMMING & SYS	4-	10	9 7/8	-1/8	-1.2
N	REYNOLDS & REYNOLD	30-	65	34 3/4	+1	+2.9
O	SEI CORP	13-	27	18 3/4	-1	-5.0
O	SHARED MEDICAL SYST	26-	38	31 3/8	-3/4	-2.3
O	SCIENTIFIC COMPUTERS	4-	8	4 5/8	-1/8	-2.6
O	SOFTWARE AG	12-	22	19 3/4	0	0.0
N	URS CORP	10-	18	17 1/8	-1/4	-1.4
N	UCCEL	11-	23	21 3/4	+1/2	+2.3
O	VM SOFTWARE	17-	31	27	-2 1/4	-7.6

SEMICONDUCTORS

EXCH		52-WEEK RANGE (1)		CLOSE JUN 18 1986	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADVANCED MICRO DEV	22-	36	21 1/2	-3 1/2	-14.0
O	ADV'D SEMICONDUCTOR	7-	23	9 1/4	-1	-9.7
O	ANALOG DEVICES INC	14-	24	18	-2	-10.0
O	ANALOGIC CORP	11-	16	12 1/8	-3/8	-3.0
N	APPLIED.MAGNETICS CP	9-	19	14 3/4	-2 1/4	-13.2
O	AVANTEK	17-	26	17 3/8	-1 1/8	-6.0
O	HADCO CORP	3-	7	5	+1/8	+2.5
O	INTEL CORP	21-	33	22 3/4	-2	-8.0
O	MICRO MASK INC	5-	12	5 1/4	0	0.0
N	MOTOROLA INC	29-	48	38 1/2	-5 1/8	-11.7
N	NAT'L SEMICONDUCTOR	10-	15	12 1/8	-1 1/8	-8.4
N	TERADYNE	17-	33	23	-1	-4.1

PERIPHERALS & SUBSYSTEMS

EXCH		52-WEEK RANGE (1)		CLOSE JUN 18 1986	WEEK NET CHNGE	WEEK PCT CHNGE
P	AM INTERNATIONAL	3-	8	8	+1/4	+3.2
A	ANDERSON JACOBSON	2-	5	2 1/8	0	0.0
O	AST RESEARCH INC	7-	33	13 3/4	-5/8	-4.3
O	AUTO-TROL TECHNOLOGY	3-	13	4 1/2	+1/8	+2.8
O	AVANT-GARDE COMPUTNG	3-	21	4	0	0.0
O	BANCTEC INC	6-	13	10 7/8	-7/8	-7.4
O	BEEHIVE INT'L	1-	2	1/8	0	0.0
N	BOLT,BERANEK & NEW	20-	48	44 3/4	-2 3/4	-5.7
O	CIMMIEX CORP	1-	3	1	-1/4	-20.0
N	CENTRONICS DATA COMP	3-	11	6 5/8	-1/4	-3.6
A	CETEC CORP	6-	9	7 1/4	0	0.0
A	COGNITRONICS	4-	7	3 7/8	-1/8	-3.1
N	COMPUGRAPHIC CORP	23-	36	23 5/8	0	0.0
O	COMPUTER TRANSCEIVER	0-	1	3/4	0	0.0
N	COMPUTERVISION CORP	9-	44	15	-5/8	-4.0
N	CONRAC CORP	12-	18	16 3/8	-1/4	-1.5
A	DATAPRODUCTS CORP	11-	20	16	-1	-5.8
A	DATAPAM CORP	4-	17	10 1/2	-1 1/2	-12.5
O	DATA SWITCH CORP	4-	9	6 1/2	-1/2	-7.1
O	DATUM INC	5-	9	6 3/8	+1/8	+2.0
O	DECISION IND CORP	10-	20	13 3/8	-5/8	-4.4
O	ENDATA, INC	2-	8	7 1/2	+3/4	+11.1
O	EVANS & SUTHERLAND	12-	27	22 5/8	-1 1/4	-5.2
O	GANDALF TECHNOLOGIES	5-	13	7 1/4	+1/8	+1.7
N	GEN'L DATA COMM IND	8-	21	12 1/8	-1/2	-3.9
N	HAZELTINE CORP	17-	30	17 1/8	+1/2	+3.0
O	ICOT CORP	3-	12	11 5/8	+1 1/4	+12.0
O	INFORMATION INTL INC	10-	17	15	0	0.0
O	INTECOM INC	3-	11	5 3/8	-1/16	-1.1
O	MEGADATA CORP	3-	8	3 1/8	-1/8	-3.8
A	MSI DATA CORP	7-	14	13 5/8	-1/4	-1.8
N	NASHUA CORP	24-	53	50	-1 1/8	-2.2
O	NETWORK SYSTEMS CORP	11-	27	13 5/8	-5/8	-4.3
N	NO AMERICAN PHILIPS	32-	47	43 1/4	+1/8	+0.2
N	NORTHERN TELECOM LTD	26-	41	29	-1/8	-0.4
O	OMEX	1-	3	1/2	+1/8	+33.3
N	PARADYNE CORP	6-	18	9 3/8	0	0.0
A	PENRIL CORP	7-	14	7 3/8	-1/8	-1.6
N	PLESSEY CO (ADR)	19-	38	35 1/2	+3 3/8	+10.5
O	PRINTRONIX INC	9-	18	13 1/4	+1/4	+1.9
O	QMS INC	6-	16	14 7/8	+5/8	+4.3
O	RAMTEK CORP	2-	7	5 1/2	-1/4	-4.3
N	RECOGNITION EQUIP	9-	17	12 1/4	-1/4	-2.0
N	SANDERS ASSOCIATES	29-	44	29	0	0.0
O	SCAN-TRON CORP	9-	23	23	+1 3/4	+8.2
N	SCIENTIFIC ATLANTA	10-	15	10 3/8	-1/8	-1.1
O	SEAGATE TECHNOLOGY	5-	13	10 5/8	-1 1/4	-10.5
N	STORAGE TECHNOLOGY	1-	5	3 3/4	0	0.0
O	SYKES DATATRONICS	0-	2	3/8	+1/8	+99.4
A	T BAR INC	5-	9	5 5/8	-5/8	-10.0
A	TAB PRODUCTS CO	9-	15	14 3/4	-1/4	-1.6
O	TANDON CORP	3-	9	6 1/8	-1 1/8	-15.5
A	TEC INC	5-	13	5 1/8	0	0.0
N	TEKTRONIX INC	47-	68	60 1/2	+3/4	+1.2
N	TELEX	34-	68	56 1/4	-3 1/4	-5.4
O	TESDATA SYSTEMS CP	0-	3	3/8	-1/16	-12.4
N	TIMEPLEX INC	15-	23	17 3/8	+1/8	+0.7
N	TITAN CORP	4-	11	9 1/2	+1/2	+5.5
O	VISUAL TECHNOLOGY	1-	3	1/2	0	0.0

LEASING COMPANIES

EXCH		52-WEEK RANGE (1)		CLOSE JUN 18 1986	WEEK NET CHNGE	WEEK PCT CHNGE
N	COMDISCO INC	7-	24	21 1/4	-3/8	-1.7
N	CONTINENTAL INFO SYS	5-	12	11 5/8	+1	+9.4
O	FINALCO GROUP INC	3-	5	3 1/8	0	0.0
O	PHOENIX AMERICAN INC	2-	6	4 1/8	-1/8	-2.9
O	SELECTERM INC	6-	12	7 1/4	+1/8	+1.7
N	U.S. LEASING	32-	48	43 1/2	+2 1/8	+5.1

EXCH: N—NEW YORK; A—AMERICAN; P—PACIFIC; B—BOSTON; L—NATIONAL; M—MIDWEST; O—OVER-THE-COUNTER

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID

-(1) TO NEAREST DOLLAR

Source: Trade Quotes, Inc.

COMPUTER INDUSTRY

INSIDE

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Akers sees IBM profit drop

Says sluggish economy may prevent '86 earning increase

By Clinton Wilder

SAN JOSE, Calif. — Describing a gloomy scenario for the U.S. computer industry in 1986, IBM Chairman John F. Akers last week predicted that IBM will record its second straight yearly earnings decline unless the U.S. economy picks up.

In his annual briefing of securities analysts at IBM's General Products Division headquarters, Akers sounded a more pessimistic note than in his April statement, in which he said the company was "cautious" about the year's prospects.

"If business does not pick up in the U.S., IBM will have difficulty showing earnings growth for the year," he said. "We haven't seen any indications yet that it has turned up."

In 1985, IBM's profits slipped from $6.58 billion to $6.55 billion, its first year-to-year earnings decline since 1979. First-quarter 1986 earnings advanced just 3.1%, and Akers said second-quarter results will be similar.

While Akers said IBM's overseas business should grow by about 20% this year, Allen J. Krowe, senior vice-president of finance and planning, later admitted that most of those gains will come from currency valuations rather than unit sales. "After you deduct the currency effect, the worldwide revenue growth is very modest," Krowe said.

Akers hinted that IBM does not plan any more price cuts in the short term to boost sales, an action that the company did take on its 3090 and 4300 lines in February. "This slow growth period means less price-elasticity of demand, and we expect price stability in the near term," Akers said.

While he hedged on the issue of further price cuts for the IBM Personal Computer line, Akers hinted that Big Blue may stop making its Personal Computer rather than fight a price war against less-expensive Asian-made PC clones.

"Our strength has always been to differentiate our products," Akers said. "If parts of the computer industry become too

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INSTANT ANALYSIS

"We feel it's a terrific investment of up to $1.5 billion. Others are buying companies for not too much more than that."

— John F. Akers, IBM chairman, president and chief executive officer, on the IBM stock buyback plan announced earlier this year

Senate expected to pass tax bill

By Mitch Betts

WASHINGTON, D.C. — The U.S. Senate tomorrow is expected to pass a historic tax reform bill that completely restructures the corporate tax code, after hotly debating the so-called "transition" rules designed to protect certain firms from the changes.

Beneficiaries of the transition rules include Control Data Corp., MCI Communications Corp. and United Telecommunications, Inc. as well as satellite investments by Federal Express Corp.

The bill must still undergo compromise negotiations in the U.S. House of Representatives before it can be enacted. In general, the thrust of the Senate bill is to lower corporate tax rates in return for ending most tax deductions and credits, with the hope of eliminating the economic bias caused by tax provisions that favor certain types of investments.

The Senate bill would reduce the top corporate tax rate to 33% from 46% and eliminate the 10% investment tax credit, which would slightly increase the cost of buying or leasing computers and other equipment.

Although most tax credits are eliminated by the bill, a coalition of high-tech companies won a four-year extension of the 25% tax credit for research and development expenditures [CW, May 19].

The Senate bill must be reconciled with a vastly different bill produced by the House of Representatives before tax reform becomes law.

However, the Senate bill has more widespread support and momentum than the House bill does, so the final legislation is likely to look more like the Senate version, predicted Julie Sedky, analyst for Washington Analysis Corp.

A controversial feature of the Senate bill is a set of transition rules intended to help specific firms deal with the major changes in tax policy. For the most part, the transition rules "grandfather" certain investments so they may retain the tax benefits of the existing law.

Sen. Howard M. Metzenbaum (D-Ohio) sharply criticized these provisions as greedy favors for special interests, but supporters said they help firms with big investments that are caught in the transi-

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INDUSTRY INSIGHT
Bob Djurdjevic

IBM backlog at record high

After a slight decline in the fourth quarter of 1985, primarily caused by the volume shipments of the 3090s, IBM's inventory resumed its steep incline in the first three months of this year.

For the first time ever, its value, at IBM's cost, exceeded $9 billion — almost double the already high level of two years ago. At the retail price level, the value of IBM inventory broke the $30 billion mark. That's about eight months' worth of sales at the 1985 hardware revenue level.

The largest increase since the first quarter of 1985 was in the finished goods category, up 48%. The greatest rise since Dec. 31, 1985, however, was in the work-in-process category, which went from $5.7 billion to $6.3 billion in just three months. The sharp rise in the finished goods inventory is an indication of the relative weakness of demand for IBM products. The work-in-process increase, however, suggests a stockpiling of current products and some unannounced ones, too.

Only three product lines are currently meeting IBM's expectations: the 3090, the 4381 and the Personal Computer AT. This means that even the peripherals, traditionally an area of strength for IBM, have now joined the list of candidates for significant price reductions.

When IBM dropped 3090 prices only a year after the machine's announcement, it was hoping there was still some price elasticity left in the marketplace. That was also the reason the 4381 product line last February underwent the most significant price/performance reductions since 1979 [CW, March 24]. The good sales of the two

See **IBM** page 122

Djurdjevic is a computer industry analyst and president of Annex Research, a Phoenix-based computer research and consulting firm.

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